

2002 VIRGINIA TOXICS RELEASE INVENTORY (TRI) REPORT

March 2004

TRI

**Summary of Data
from 2002 Industry Reports**



DEQ POLICY AND PROGRAMS

It is the policy of the Virginia Department of Environmental Quality to protect the environment of Virginia in order to promote the health and well-being of the Commonwealth's citizens. To this end, the Department implements numerous programs, as described on the Department's website at <http://www.deq.state.va.us/programs/homepage.html>. These range from media programs on Air Quality, Water Quality, and Waste Management, to area programs (such as the Chesapeake Bay Program and the Virginia Coastal Program), to more specific programs (such as Small Business Assistance and Citizen Monitoring), and others too numerous to set out here. The Department is committed to pollution prevention and elimination or reduction of waste at the source of generation. Pollution prevention programs include the Virginia Environmental Excellence Program, Businesses for the Bay, and the Virginia Mentoring Network. All parts of the agency and other sectors of government, all Virginia businesses and industry, and all Virginia's citizens have a role in managing and controlling the release of toxic chemicals in the Commonwealth.

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Executive Summary

2002 Virginia Toxics Release Inventory (TRI) Report

In March of each year, the Virginia Department of Environmental Quality (Department) publishes the Virginia Toxics Release Inventory (TRI) Report, in accordance with Virginia Code § 10.1-1186.1. The Virginia TRI Report contains information on the release or other management of listed chemicals and chemical categories, as reported by Virginia industries in specified industrial sectors and by federal facilities located within the Commonwealth. The facilities' reports are required under federal law, known as the Emergency Planning and Community Right-to-Know Act (EPCRA), or SARA Title III. The Virginia TRI Report is a multi-media report, covering air, water, and waste management activities, and it addresses a variety of handling practices, including releases, recycling, energy recovery, and on-site and off-site treatment and disposal.

The Virginia TRI Report has been published in various formats beginning with data for calendar year 1988. In October 2003, the Department held a stakeholders' meeting on ways to improve the Virginia TRI Report. As a result, this report has been restructured and expanded to make it clearer and more complete. Some of the stakeholder's recommendations, such as the use of geographic information system (GIS) links, could not be implemented this year but may be considered for inclusion in future reports.

This year's Virginia TRI report covers calendar year 2002, the most recent year for which data is available, and includes all reports and revisions received by the Department on or before January 14, 2004. For calendar year 2002, 504 Virginia facilities filed 2010 individual reports on the release, transfer, or management of TRI chemicals or chemical categories. This was a slight (1%) decrease from the 508 facilities and 2030 reports filed for calendar year 2001. In 2002, Virginia facilities reported the release, transfer, or management of 157 chemicals and chemical categories, out of the more than 650 chemicals and chemical categories that are subject to the TRI. According to the reports, Virginia facilities reported the release, transfer, or on-site management of more than 406 million pounds of TRI chemicals during calendar year 2002. Of this total:

71.2 million pounds of TRI chemicals were released on-site at reporting Virginia facilities;

68.9 million pounds of TRI chemicals were transferred off-site from reporting Virginia facilities for treatment, recycling, energy recovery, or disposal; and

An additional 266.3 million pounds of TRI chemicals were managed on-site by treatment, recycling, or energy recovery.

Each of these three amounts represents a small (<1%) increase over the amounts reported for calendar year 2001.

The Virginia TRI Report addresses separately those TRI chemicals that the U.S. Environmental Protection Agency (EPA) has designated as persistent bioaccumulative toxins (PBTs). These chemicals remain in the environment for long periods of time, are not readily destroyed, and build up or accumulate in body tissue. According to the 2002 PBT reports:

365,032 pounds of PBT TRI chemicals were released on-site at reporting Virginia facilities;

3.4 million pounds of PBT TRI chemicals were transferred off-site from reporting Virginia facilities for treatment, recycling, energy recovery, or disposal; and

An additional 22,396 pounds of PBT TRI chemicals were managed on-site by treatment, recycling, or energy recovery.

Dioxins and dioxin-like compounds account for just over 278 grams (approximately 0.61 pounds) of the PBT chemicals released, transferred, or managed by Virginia facilities during calendar year 2002.

As required by statute, the Virginia TRI Report also addresses industrial sectors (identified by standard industrial code), facilities, and facility location (jurisdiction). For calendar year 2002, three reporting industrial sectors account for 71.7% of the total on-site releases to the environment. These were: electric, gas, and sanitary services; paper and allied products; and chemicals and allied products. The text of the report details further information about the industrial sectors, facilities, and jurisdictions with the largest reported on-site releases and other management of TRI chemicals.

The Virginia TRI Report provides the public with information concerning specified toxic chemicals and chemical compounds that are manufactured, processed, or otherwise used at categories of Virginia facilities. Responsible use of this information can help both the public and industry identify potential concerns and develop effective strategies for reducing toxic chemical usage and release. However, the TRI data does not represent a measure of the public's exposure to chemicals, nor does it assess risk. Many of the releases are regulated and permitted under other state and federal programs that are designed to protect human health and the environment. Because of differences in reporting schedules and receipt of reports, the information in the Virginia TRI Report will not completely match the information in the national Toxics Release Inventory - Public Data Release, as published by EPA.

It is the policy of the Virginia Department of Environmental Quality to protect the environment of Virginia in order to promote the health and well-being of the Commonwealth's citizens. To this end, the Department implements numerous programs, as described on the Department's website at <http://www.deq.state.va.us/programs/homepage.html>. The Department is committed to pollution prevention and elimination or reduction of waste at the source of generation. All parts of the agency and other sectors of government, all Virginia businesses and industry, and all Virginia's citizens have a role in managing and controlling the release of toxic chemicals in the Commonwealth.

Introduction

Part One - Virginia TRI Reporting

Statutory and Regulatory Basis

The Virginia Toxics Release Inventory (TRI) Report is published annually pursuant to Virginia Code § 10.1-1186.1 (see Appendix A). It contains information on the release, transfer, or management of listed chemicals and chemical categories, as reported by over 500 Virginia industries and federal facilities. The facilities are required to submit their reports pursuant to the federal Emergency Planning and Community Right to Know Act, as amended (EPCRA), also known as SARA Title III.¹ The Virginia Code directs the Virginia Department of Environmental Quality (the Department) to publish the Virginia TRI Report in March of each year and to include information for the most recent calendar year for which data are available - in this case, calendar year 2002. The Virginia Code also directs that the report be organized by chemical, facility, facility location, and standard industrial classification (SIC) code. Federal regulations require facilities to submit their TRI reports both to the U.S. Environmental Protection Agency (EPA) and to the Commonwealth. The Virginia TRI Report is compiled directly from the reports received from Virginia facilities.

A Glossary of Terms used in this report is included as Appendix B.

Current Year (2002) Virginia Facility Reports

Under the federal requirements, facilities are required to submit their reports for a calendar year by the following July 1 - for example, facilities were required to file their reports on their calendar year 2002 activities on or before July 1, 2003. Therefore, data for calendar year 2002 are the most recent available for this March 2004 report. This year's Virginia TRI Report includes all reports and revisions received by the Department on or before January 14, 2004. For reporting year 2002, 504 Virginia facilities filed 2010 individual reports on the release or other management of TRI chemicals or chemical categories. This was a slight (1%) decrease from the 508 facilities and 2030 reports that were filed for reporting year 2001. Data for all reporting years are available to the public from the DEQ's SARA Title III office. This report and its attachments are also available to the public over the Internet (<http://www.deq.state.va.us/sara3/313.html>) and in written form.

In 2002, Virginia facilities reported the release, transfer, or management of 157 of the more than 650 chemicals and chemical categories that are subject to the TRI.

Improvements to the 2002 Virginia TRI Report

In October 2003, the Department held a TRI stakeholders' meeting to receive comments on improving the Virginia TRI Report. The participants included representatives of TRI reporting facilities, environmental advocacy groups, wastewater treatment industries, and a university researcher. The

¹ 42 U.S.C. § 11023, or SARA § 313.

Department requested comments on data quality and utility, report format and readability, and public outreach. A meeting summary is included as Appendix C. In response, this year's TRI report contains additional information on the release, transfer, and management of TRI chemicals, including separate rankings by industry sector and jurisdiction. Additional appendices have been included, and the format of the report has been changed slightly to make it more readable. None of the analyses from the 2001 report have been altered or omitted. Nevertheless, not all of the stakeholder's suggestions (such as a suggestion to include a risk assessment) could be accommodated. Assessing risk is beyond the statutory charge and is subject to conflicting interpretations and opinions. A request to make the TRI data accessible through a geographic information system (GIS) may be considered for future reports, but could not be accommodated this year. Readers are encouraged to utilize the resources listed in this report and its appendices along with other data to assist with their understanding of the overall use, release, management, and health hazard of TRI chemicals.

Part Two - National Toxics Release Inventory Reporting Program

The National Toxics Release Inventory

The Virginia TRI Report is compiled directly from reports that Virginia facilities submit under federal law and regulations.² Using those same authorities, EPA compiles and maintains nation-wide information in its *Toxics Release Inventory - Public Data Release*, which is available to the public over the Internet (<http://www.epa.gov.tri>) and in written form. The national Toxics Release Inventory was established to provide information to the public about the presence and release of toxic and hazardous chemicals in their communities. From its inception, the national TRI program (and consequently the Virginia TRI program) has been expanding and evolving to meet the needs of an informed public. More detailed information about the historical changes to the TRI program can be found in Chapter Four and in Appendix D.

Facilities That Must Report

Under the national TRI program, a facility must submit a TRI report (or reports) to EPA and the state if:

- 1) **It has ten or more full-time employees** (a combined total for all employees of 20,000 hours or more for the year);
- 2) **The facility's primary business is within one of 29 specified Standard Industrial Classification (SIC) codes.** The industry sectors include metal mining, coal mining, paper and allied products, chemicals and allied products, petroleum terminals and bulk stations, and others. The complete list of covered industry groups is in Appendix E; and
- 3) **The facility manufactured, processed, or otherwise used a reportable toxic chemical in quantities greater than the established threshold in the course of a calendar year.** The annual thresholds for non-PBT chemicals are 25,000 pounds for manufacturing, 25,000 pounds for

² The national TRI was established under Title III, Section 313, of the Federal Superfund Amendments and Reauthorization Act (SARA), which is also known as the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA), 42 U.S.C § 11023. The related federal regulations are found at 40 CFR Part 372.

processing, and 10,000 pounds for "otherwise use" of a TRI chemical. For PBT chemicals, the thresholds are lower. For example, dioxin and dioxin-like compounds have a threshold of 0.1 gram, and lead and lead compounds have a threshold of 100 pounds. For PBT chemicals, these lower reporting thresholds apply whether the chemical is manufactured, processed, or otherwise used. The definitions of "manufactured," "processed," and "otherwise used" can be found in the Glossary of Terms (Appendix B).

Federal facilities are also required to comply with EPCRA and the Pollution Prevention Act (PPA) of 1990, in accordance with Executive Order 13148. That Executive Order requires all federal facilities that manufacture, process, or otherwise use any listed EPCRA Section 313 chemical above the reporting threshold to submit a TRI report. The first federal facility reports were submitted on or before July 1, 1995 for calendar year 1994.

Chemicals and Chemical Categories

For a chemical or chemical category to remain on or be added to the TRI list, it must be known to cause or reasonably be anticipated to cause one of the following:

- adverse acute health effects at significant concentration levels beyond facility boundaries as a result of continuous or frequently occurring releases;
- cancer in humans; or
- a significant adverse effect on the environment because of its toxicity and persistence in the environment.

As new chemicals of concern are identified, they are added to the TRI list. Conversely, if TRI chemicals are found not to meet the toxicity requirements, they can be deleted. Currently, the reportable TRI chemical list contains over 650 chemicals and chemical categories. A complete list of TRI chemicals and chemical categories for calendar year 2002 reports can be found in the EPA publication "The Emergency Planning and Community Right-to-Know Act - Section 313 Release and other Waste Management Reporting Requirements" (EPA260/K-01-001, February, 2001). The publication can be found online at: http://www.epa.gov/tri/guide_docs/2001/brochure2000.pdf. As noted, for 2002, Virginia facilities reported the release, transfer, or management of 157 of the more than 650 chemicals and chemical categories that are subject to the TRI.

Reporting Forms and Activities That Must Be Reported

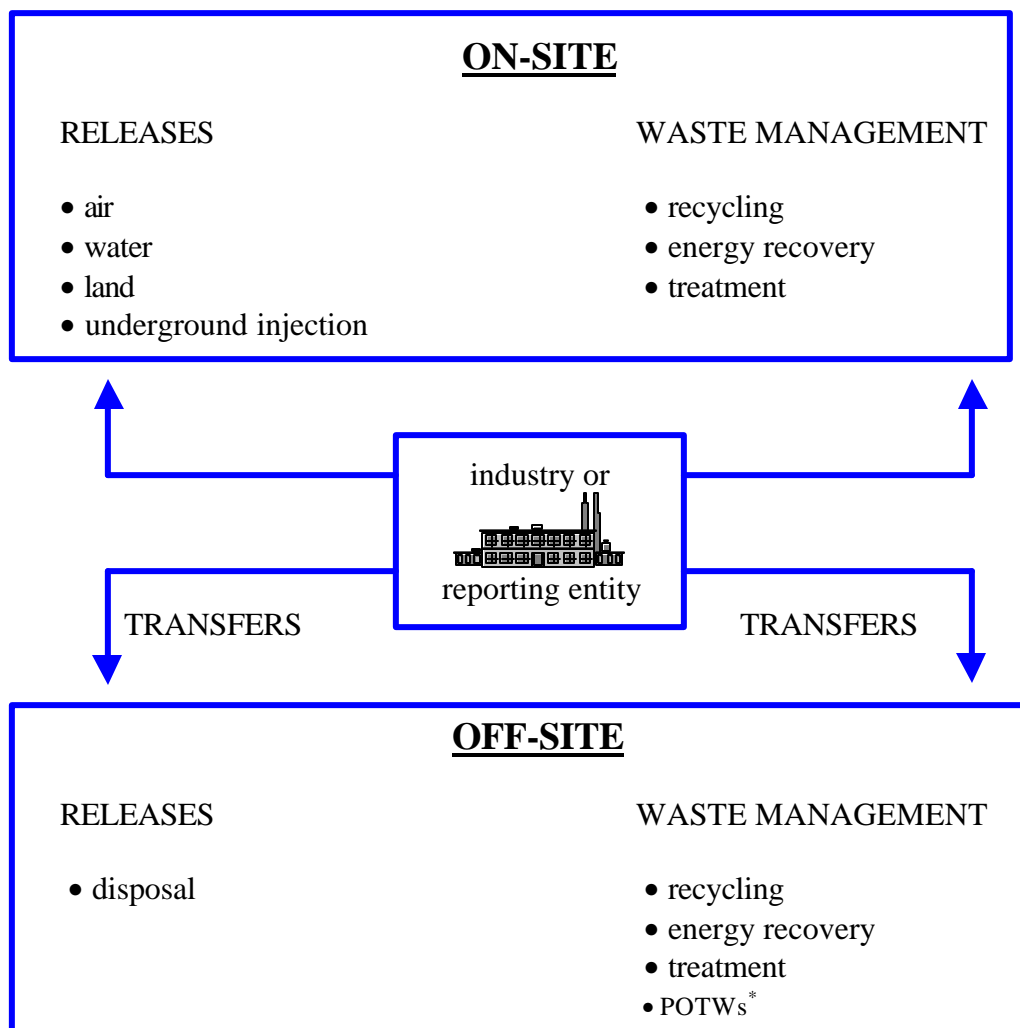
Each year, reporting facilities submit one reporting form for each TRI chemical or chemical category that is manufactured, processed, or otherwise used in amounts equal to or greater than the threshold values. For each TRI chemical or chemical category, facilities must submit either a Form A (simplified form) or a Form R (long form). Examples of both forms are in Appendix F. Form A has restrictions governing its use. A facility can use Form A only if the total annual reportable amounts for an individual chemical or category do not exceed 500 pounds, and if the facility's total manufactured, processed, and/or otherwise used amounts do not exceed one million pounds. PBTs cannot be reported on Form A.

Data used to prepare quantitative information in the Virginia TRI Report come principally from Part II of the Form R reports, and specifically from Sections 5, 6, 7, and 8 of Part II, Form R. These sections are referred to throughout the Virginia TRI Report and are described below:

- **Section 5: Quantity of toxic chemical entering/releasing to each environmental medium on-site.** Release reporting is broken down into categories: releases to the air (from stack and fugitive emissions), releases to water (total and percent of total from stormwater), and releases to land (underground injection, disposal to land, RCRA Subtitle C landfill, other landfills, land treatment/application farming, surface impoundment, or other disposal).
- **Section 6: Transfers of the toxic chemical in wastes to off-site locations.** Section 6 contains two main subsections: transfers to publicly owned treatment works (POTWs); and transfers to all other off-site locations (in-state or out-of state). Facilities are required to provide the name and location of off-site locations, the quantity transferred, and the method of management (treated, disposed, recycled, or burned for energy recovery).
- **Section 7: On-site waste treatment methods and efficiency (including energy recovery processes and recycling processes).** Facilities are asked to provide mostly qualitative information on the on-site treatment processes, the estimated range of influent concentration, and the efficiency of the operation.
- **Section 8: Source reduction and recycling activities.** Section 8 was added to the Form R reporting as a result of the federal Pollution Prevention Act in 1990, to track production-related activities. Section 8 extracts and re-aggregates data reported in Sections 5 through 7 into environmental releases (production-related on-site and off-site releases), off-site transfers/management, and on-site management. Where Section 7 contains qualitative information about on-site management practices, a subsection of Section 8 asks for related quantitative data. Section 8 and its subsections also request previous-year reporting and future year estimates for production-related releases, transfers for off-site management, and on-site management. Other subsections of Section 8 ask for episodic/catastrophic releases (non-production related), qualitative information on source reduction activities, and a production ratio or activity index to better engage the facility's efforts in source reduction.

The flow chart (Figure 1) shown below illustrates the information collected on Form R for TRI chemicals:

Figure 1 - Schematic Diagram of the TRI Data Collection Coverage



Part Three - Uses and Limitations TRI Data

The Virginia TRI Report provides the public with information concerning designated toxic chemicals and chemical categories manufactured, processed, or otherwise used at facilities, including the amounts released to the environment and managed as wastes. Responsible use of this information can enable the public to identify potential concerns, and to work with industry and government to reduce toxic chemical releases and the risks associated with them.

Industry can use the data to obtain an overview of use and release of toxic chemicals, to identify and reduce costs associated with toxic waste, to identify promising areas for pollution prevention, to establish reduction targets, and to measure and document progress toward reduction goals.

* Publicly Owned Treatment Works

The public availability of the data has assisted many facilities in working with their communities to develop effective strategies for reducing environmental and human health risks that may result from toxic chemical releases. Since the TRI Program's inception in 1988, there has been a historic downward trend in the amount of TRI chemicals released to the environment and managed as wastes, although the data for calendar year 2002 show a small (<1%) increase in the amounts released on-site, transferred off-site, and managed on-site over 2001 (see Chapter 4).

Nevertheless, there are limitations on the use of TRI data:

1. The TRI report contains reported information on the quantities of chemicals released and managed, not the public's exposure to or risk from the chemicals. Risk to human health by a chemical release depends on the toxicity of the chemical, how it disperses, reacts, or persists in the environment, and includes the quantity, concentration, and type of human exposure. Furthermore, chemicals reported for the TRI report are not weighted by their toxicity. For example, a pound of one substance may be more toxic or hazardous than 1000 pounds of another. Due to the limited nature of TRI data collected, readers are strongly discouraged from making any health or environmental risk/exposure assessments from the information presented. Many of the TRI chemical releases are permitted under other federal and state regulatory programs; therefore, data from these regulatory programs should provide additional information to better inform the citizens about their environment.
2. The TRI program captures only a portion of all toxic chemical releases in Virginia. It does not account for TRI chemicals from most non-manufacturing facilities, facilities with fewer than ten employees, facilities that do not meet the chemical quantity thresholds, other non-industrial sources, and transportation-related emissions.
3. The majority of facilities report TRI data based on estimates, since the TRI program does not require that they monitor releases, only that they use best available data. Using different methods to estimate data can result in significant variability from one facility to another, as well as from one year to the next.
4. Patterns of releases and other waste management activities can change significantly from one year to the next. Thus, the data in this report for a specific facility may be different from those reported for 2001.
5. Direct comparison between figures in this report and figures in past Virginia Toxics Release Inventory (TRI) Summary Reports is discouraged because of changes in reporting requirements and the authorized incorporation of revisions from previous years. Several historical comparisons, with appropriate standardization of data, have been made in Chapter 4 and Appendix G of this report.
6. EPA is required by law to compile an annual *Toxics Release Inventory - Public Data Release* on the national level. It is known and anticipated that the data published in the Virginia TRI Report will not completely correspond to the data published by the EPA. Contributing factors include: differing dates on which data are extracted for processing, revised facility reports, and facilities that report to the Commonwealth or EPA but not both. The Department and EPA continue to work together to rectify such differences.

Chapter One - 2002 Virginia TRI Data Review

Chapter 1 describes the 2002 reporting year data in its entirety, based on the type of activity and the chemicals and chemical categories reported. The chapter is divided into four parts. Part One presents an overview and summary of 2002 data collected. Part Two discusses on-site releases of TRI chemicals to the environment, whether to air, water, or land. These data are derived from Section 5 of the Form R reports, as described in the Introduction. Part Three of the chapter discusses the off-site transfers of TRI chemicals, whether to publicly owned treatment works (POTWs) or to other off-site locations. These data are derived from Section 6 of the Form R reports. Part Four of the chapter discusses on-site and off-site management activities. These data are derived from Section 8 of the Form R reports. While this chapter includes all TRI chemicals, Chapter 2 addresses persistent bioaccumulative toxic (PBT) chemicals in more detail.

As described in the Introduction, Section 8 of the federal Form R asks facilities to extract and re-aggregate certain data from Sections 5 and 6. To avoid double-counting these chemicals in the Overview and Summary, only data that are independent of Sections 5 and 6 are presented when discussing "On-Site Management" in Part One of this chapter. When discussing Section 8 data as a whole, however, in Part Four of this chapter, all Section 8 data are used, including data extracted and re-aggregated from Sections 5 and 6, so that the balance between various on- and off-site management activities can be shown.

Appendices H and I contain facility-specific information, arranged by jurisdiction, for TRI chemicals (excluding PBTs) and for PBT chemicals, respectively.

Part One - 2002 Overview and Summary

For calendar year 2002, Virginia facilities reported that they released, transferred, or managed over 406 million pounds of TRI chemicals (see Table 1).

Approximately 71.2 million pounds of TRI chemicals were reported to have been released on-site to the environment. Air releases represented approximately 56.9 million pounds, or 80% of all the TRI chemicals released on-site in 2002. Releases to the water totaled approximately 8.3 million pounds, or 11.6% of the total released on-site. Releases to the land totaled approximately 6.0 million pounds, or 8.4% of the total released on-site. For 2002, the amount of TRI chemical releases to the environment represented approximately 17.5% of the total for TRI chemicals by this measure.

Off-site transfers totaled approximately 68.9 million pounds of TRI chemicals. Off-site transfers to Publicly Owned Treatment Works (POTWs) totaled approximately 17.3 million pounds. Off-site transfers to other (non-POTW) facilities (for treatment, recycling, energy recovery and disposal) totaled approximately 51.5 million pounds.

Facilities reported that approximately 266 million pounds of TRI chemicals were managed on-site by treatment, recycling, or energy recovery.

Table 1. Summary of Data by Type of Release, Transfer, and On-Site Management for TRI Chemicals (in pounds per year)

| | | |
|---|-------------|--------------------|
| ON-SITE RELEASES BY MEDIA (Section 5 of Form R) | | |
| Total Air | | 56,923,346 |
| Fugitive Air | 6,392,054 | |
| Stack Air | 50,531,292 | |
| Water | | 8,262,380 |
| Total Land | | 5,973,504 |
| Total On-Site Releases to Media | | 71,159,230 |
| OFF-SITE TRANSFERS BY TYPE (Section 6 of Form R) | | |
| Publicly Owned Treatment Works (POTWs) (includes metals and metal compounds) | | 17,327,432 |
| Total Other Off-Site Transfers | | 51,533,591 |
| Off-Site Transfers for Recycling | 29,444,577 | |
| Off-Site Transfers for Energy Recovery | 11,597,088 | |
| Off-Site Transfers for Other Treatment | 2,030,466 | |
| Off-Site Transfers for Disposal | 8,461,460 | |
| Total Off-Site Transfers | | 68,861,023 |
| ON-SITE MANAGEMENT (From Section 8 of Form R) * | | |
| Treated On-Site | 118,522,101 | |
| Recycled On-Site | 100,513,775 | |
| Energy Recovery On-Site | 47,264,002 | |
| Total On-Site Management | | 266,299,878 |
| Total TRI Chemicals Released On-site, Transferred Off-site, or Managed On-site by Reporting Facilities | | 406,320,131 |

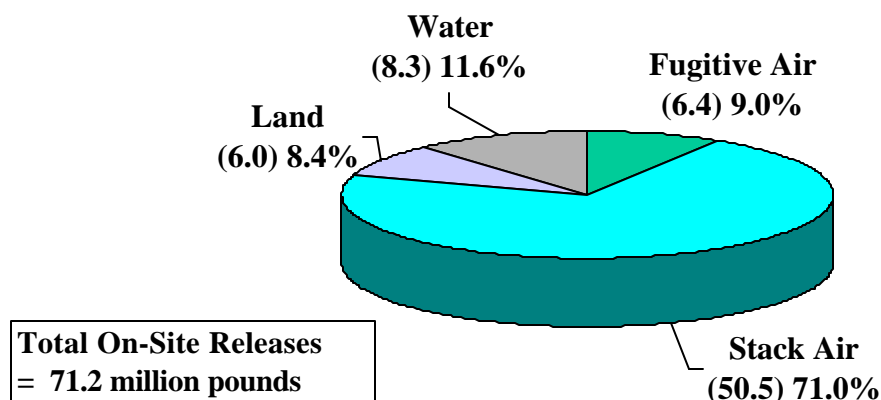
* The data for the on-site management of TRI chemicals is a summary of data collected from Part II, Sections 8.2, 8.4, and 8.6 of the Form R. These sections, in turn, are quantitative data not reported anywhere else in the Form R and reflect on the descriptive data reported in Part II, Section 7 (on-site management practices - treatment, energy recovery, and recycling) of the Form R. Data extracted and re-aggregated to Section 8 from Sections 5 and 6 of Form R have not been included here, to avoid duplicate counting.

Part Two - On-Site Releases to the Environment

Part Two of this Chapter discusses the on-site releases of TRI chemicals to the environment by facilities, as reported in Section 5 of the TRI Form R. The quantities reported in Section 5 include production-related releases and any catastrophic releases or one-time events not associated with routine production processes.

A release refers to an on-site discharge of TRI chemicals to the air, water, land, and/or disposal in underground injection wells. Any reductions in waste achieved by on-site treatment methods are taken into account when facilities determine their release data. Approximately 71.2 million pounds of TRI chemicals were reported as released into the environment by reporting facilities for reporting year 2002.

Figure 2. On-Site Releases of TRI Chemicals to All Media for Reporting Year 2002 (from Section 5 of Form R. The number inside the parentheses is the quantity of releases in each category in millions of pounds, and the percent figure is the percent of total on-site releases.) There were no reported releases by underground injection in 2002.

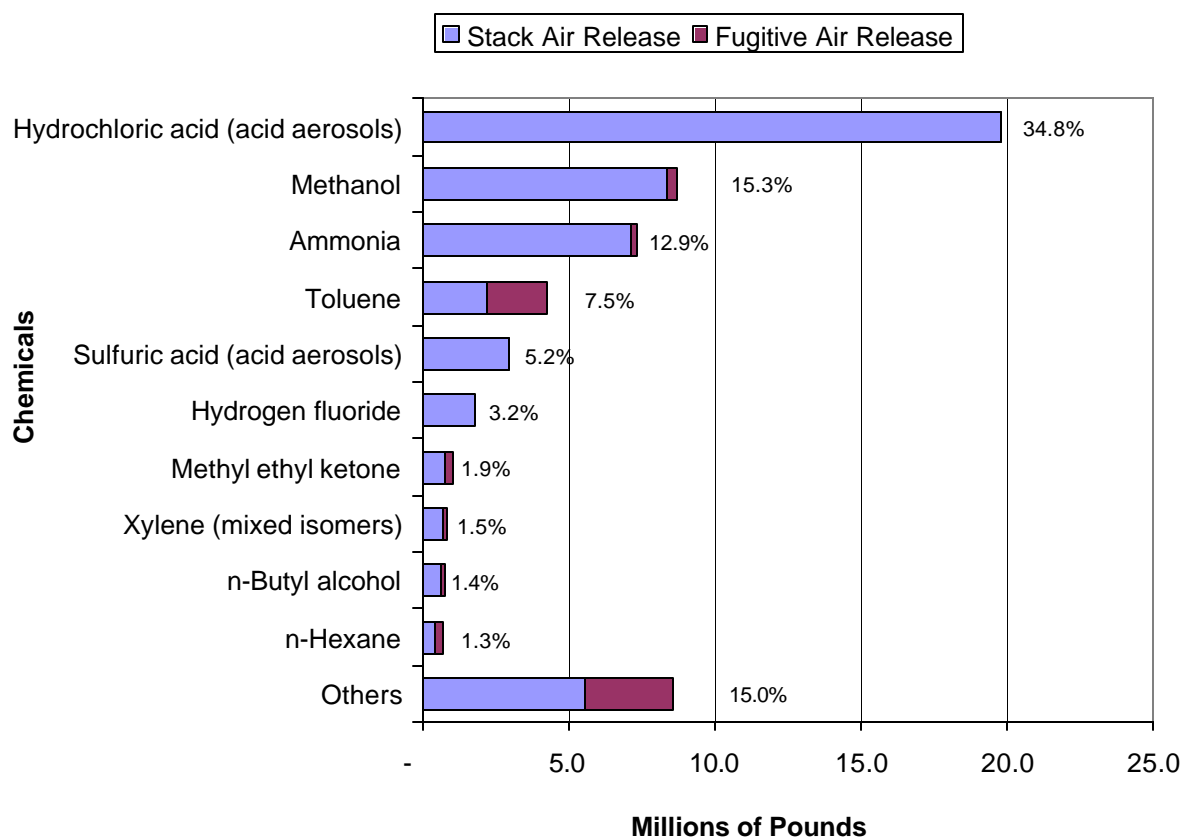
**On-Site Releases to the Air**

On-site air releases are classified as either “fugitive” (non-point source) or “stack” (point source) air emissions. Examples of fugitive air emissions are equipment leaks from valves, pump seals, flanges, compressors, sampling connections, open-ended lines, and evaporative losses from surface impoundments and spills. Stack air emissions are releases to the air that are conveyed through stacks, ducts, pipes, vents, or other confined air streams. Most, if not all, facilities reporting to TRI have permitted stack air emissions.

Based on the amount of fugitive and stack air emissions reported, total air releases of all TRI chemicals was 56.9 million pounds, which accounted for 80% of the total on-site releases to media (air, water, and land). The top ten TRI chemicals released to the air made up approximately 85% of the total reported TRI air emissions in 2002 (See Figure 3). The top ten TRI chemicals released to the air in Virginia were: hydrochloric acid, methanol, ammonia, toluene, sulfuric acid, hydrogen fluoride, methyl ethyl ketone, xylene (mixed isomers), n-butyl alcohol, and n-hexane. Acid aerosols such as hydrochloric acid,

sulfuric acid, and hydrogen fluoride were mainly generated during the combustion of coal or oil. Electric power generating facilities, in particular, contributed to the emissions of acid aerosols. Methanol, ammonia, and toluene continued to be the significant air pollutants generated from the manufacturing sector.

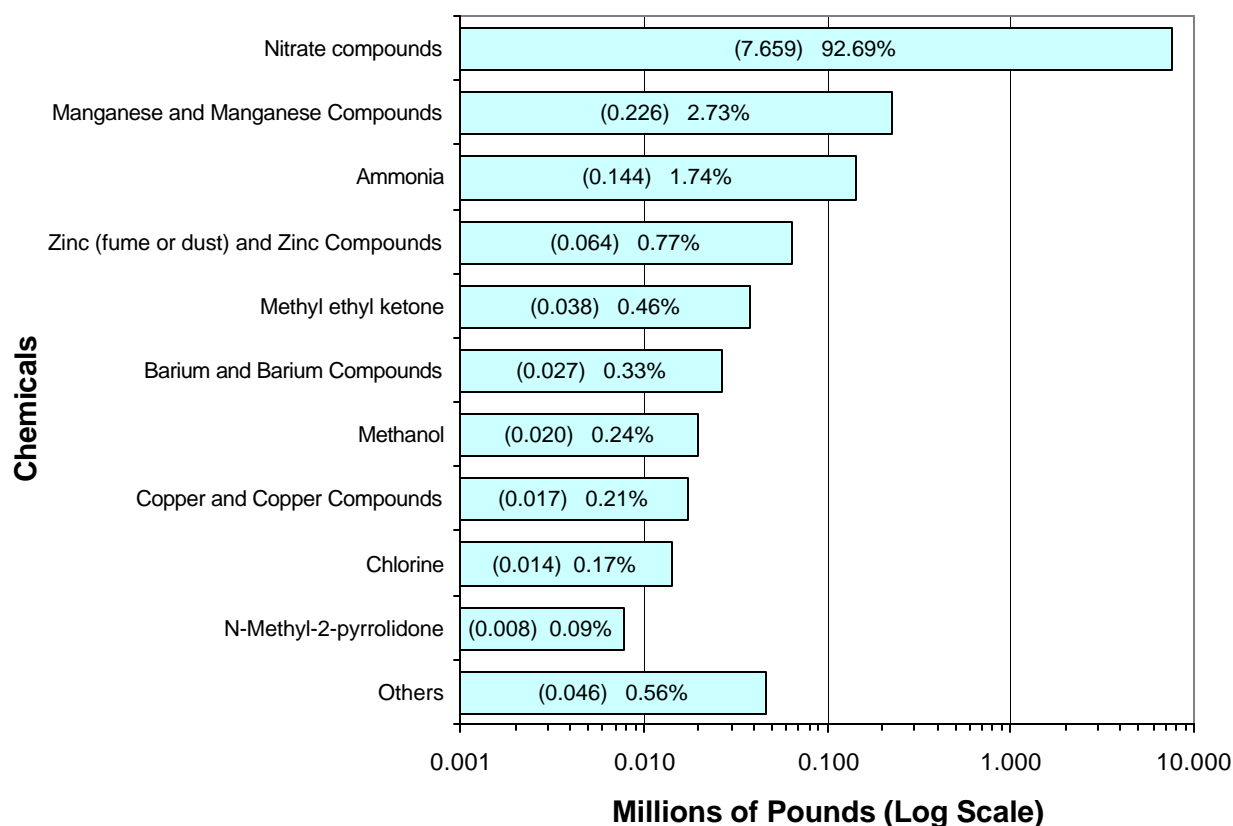
Figure 3. Top Ten TRI Chemicals Released to the Air On-Site in 2002 (from Section 5 of Form R. The number next to each bar is the % of total air releases for all 2002 chemicals reported.)



On-Site Releases to Water

On-site releases to water include discharges to surface waters, such as rivers, lakes, ponds, and streams. Reported on-site releases of TRI chemicals to water in 2002 totaled 8.3 million pounds and accounted for 11.6% of all on-site releases to the air, water, and land in 2002. Ten chemicals and chemical categories accounted for more than 99% of the on-site TRI chemical releases to the water. The top ten TRI chemicals released to water were: nitrate compounds (92.7% of total releases to water), manganese and manganese compounds, ammonia, zinc and zinc compounds, methyl ethyl ketone, barium and barium compounds, methanol, copper and copper compounds, chlorine, and n-methyl-2-pyrrolidone. Nitrate compounds are a common byproduct of industrial wastewater treatment processes and have consistently been reported as the major chemical released to the surface water. Nitrates can pose a nutrient problem to water bodies.

Figure 4. Top Ten TRI Chemicals Released to Water On-Site in 2002 (from Section 5 of Form R.) The information presented here is in logarithmic, base 10 scale, which compresses the bar chart to show up to 957-fold magnitudes of difference between nitrate compounds and n-methyl-2-pyrrolidone. Please note the scale mark of 1.000 means 1 million pounds, the scale mark of 0.100 means 0.1 million pounds, etc. The number in the parentheses represents the quantity in millions of pound followed by percent of total reported releases to water.

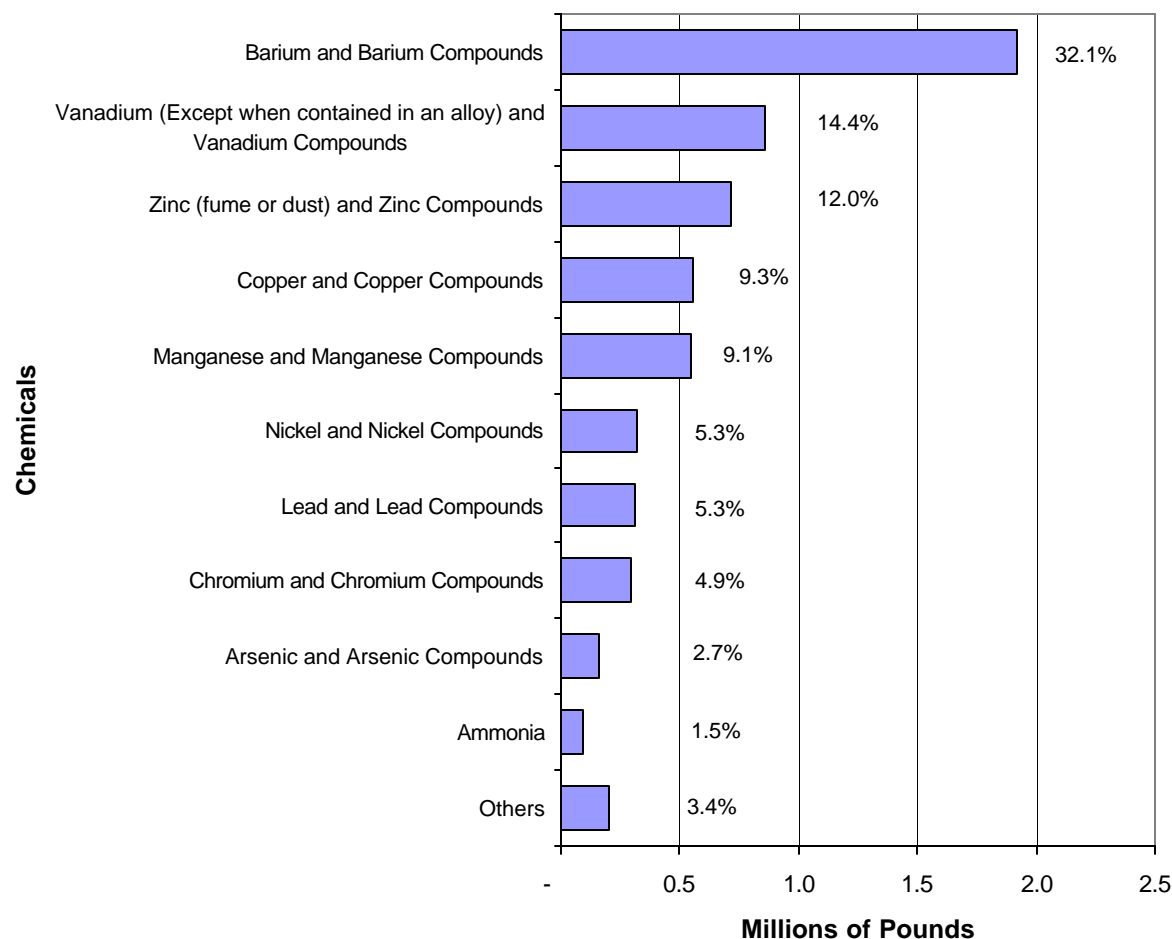


On-Site Releases to the Land

On-site releases to the land refer to landfilling, surface impoundment, land treatment/application farming, or any other release of a TRI chemical to land within the boundaries of a facility. Virginia does not permit underground injection as a method of hazardous waste disposal, and no underground injection of TRI chemicals was reported in 2002.

The total amount of TRI chemicals released to the land in Virginia during 2002 was 6.0 million pounds. That accounted for 8.4% of all reported on-site TRI releases (releases to the air, water, and land). The top ten TRI chemicals constituted approximately 96.6% of all the TRI chemicals released to the land. They were: barium and barium compounds, vanadium and vanadium compounds, zinc and zinc compounds, copper and copper compounds, manganese and manganese compounds, nickel and nickel compounds, lead and lead compounds, chromium and chromium compounds, arsenic and arsenic compounds, and ammonia (Figure 5). Metals and metal compounds such as barium are found naturally in coal combusted for energy generation and in the ashes remaining after combustion of the coal. Ammonia is the only chemical in the top ten list that is not a metal.

Figure 5. Top Ten TRI Chemicals Released On-Site to the Land in 2002 (from Section 5 of Form R. The number next to each bar is the % of total on-site land releases for all 2002 chemicals reported.)



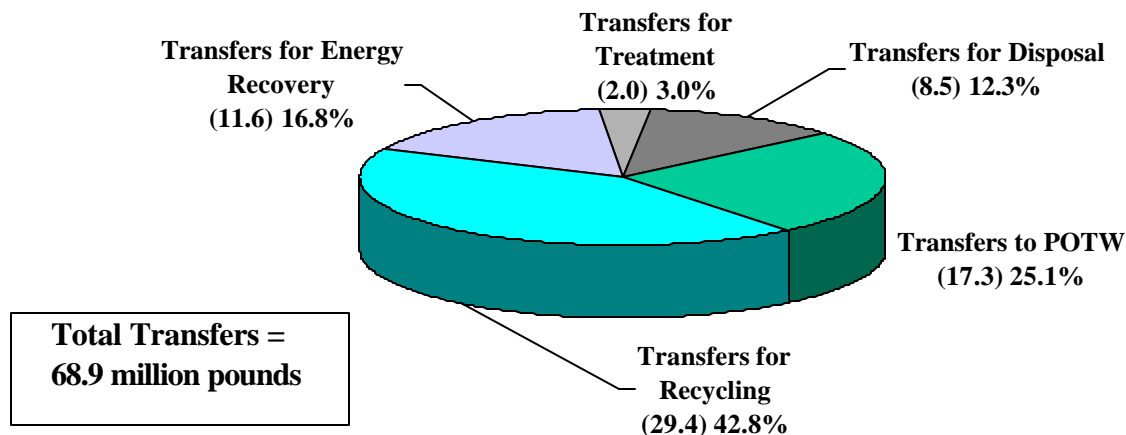
Part Three - Off-Site Transfers

Transfers refer to TRI chemicals sent off-site. Transfers are reported as transfers to Publicly Owned Treatment Works (POTWs) or other off-site destinations, such as incinerators, landfills, or other facilities for treatment, recycling, energy recovery, or disposal that are not part of the reporting facility.

In this section, data are collected from Section 6 of Form R. For 2002, 68.9 million pounds of TRI chemicals were reported as sent off-site for further management or disposal.

Figure 6. All Off-Site Transfers of TRI Chemicals for Reporting Year 2002

(from Section 6 of Form R. The number inside the parentheses is the quantity of transfers in each category in millions of pounds and the percent figure is the percent of total transfers.)

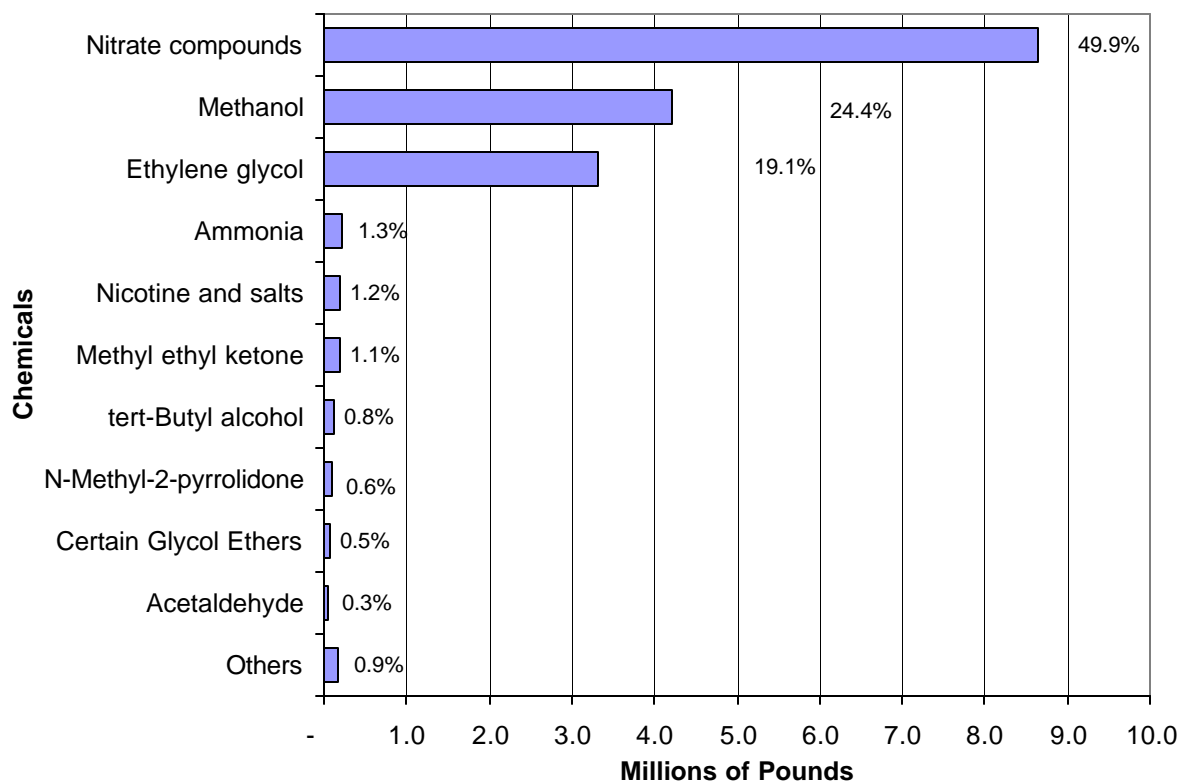


Transfers to Publicly Owned Treatment Works (POTWs)

A POTW is a wastewater treatment facility that is owned by a state or local government. Wastewater from facilities reporting under TRI is transferred through pipes or sewers to the POTW. The TRI information summarized below simply reports transfers of a chemical to a POTW. However, this is not necessarily the same as the release of a chemical to the environment. TRI chemicals may be treated, destroyed, and/or removed from the environment in a POTW's physical, chemical, and biological treatment processes. Some TRI chemicals are almost completely destroyed by a POTW. The net release to the environment of some chemicals after the POTW treatment process is reported to be up to 98% lower than the "transfers to POTW" value reported in the TRI. However, not all chemicals can be treated or removed by a POTW. Some chemicals such as metals and metal compounds may be removed, but are not destroyed. These may ultimately be disposed of in a permitted landfill or permitted land application process, with any residual levels not removed being released through a permitted discharge to receiving waters.

Ten TRI chemicals accounted for approximately 99% or 17.2 million pounds of the total 17.3 million pounds of TRI chemicals transferred to POTWs in reporting year 2002. Nitrate compounds are a common byproduct of industrial wastewater treatment processes and have been the leading pollutant discharged to POTWs for treatment. The remaining top ten TRI chemicals transferred to POTWs in 2002 were: methanol, ethylene glycol, ammonia, nicotine and salts, methyl ethyl ketone, tert-butyl alcohol, n-methyl-2-pyrrolidone, glycol ethers, and acetaldehyde.

Figure 7. Top Ten TRI Chemicals Transferred to Publicly Owned Treatment Works (POTWs) in 2002 (from Section 6.1 of the Form R. The number next to each bar is the % of total transfers to POTW)

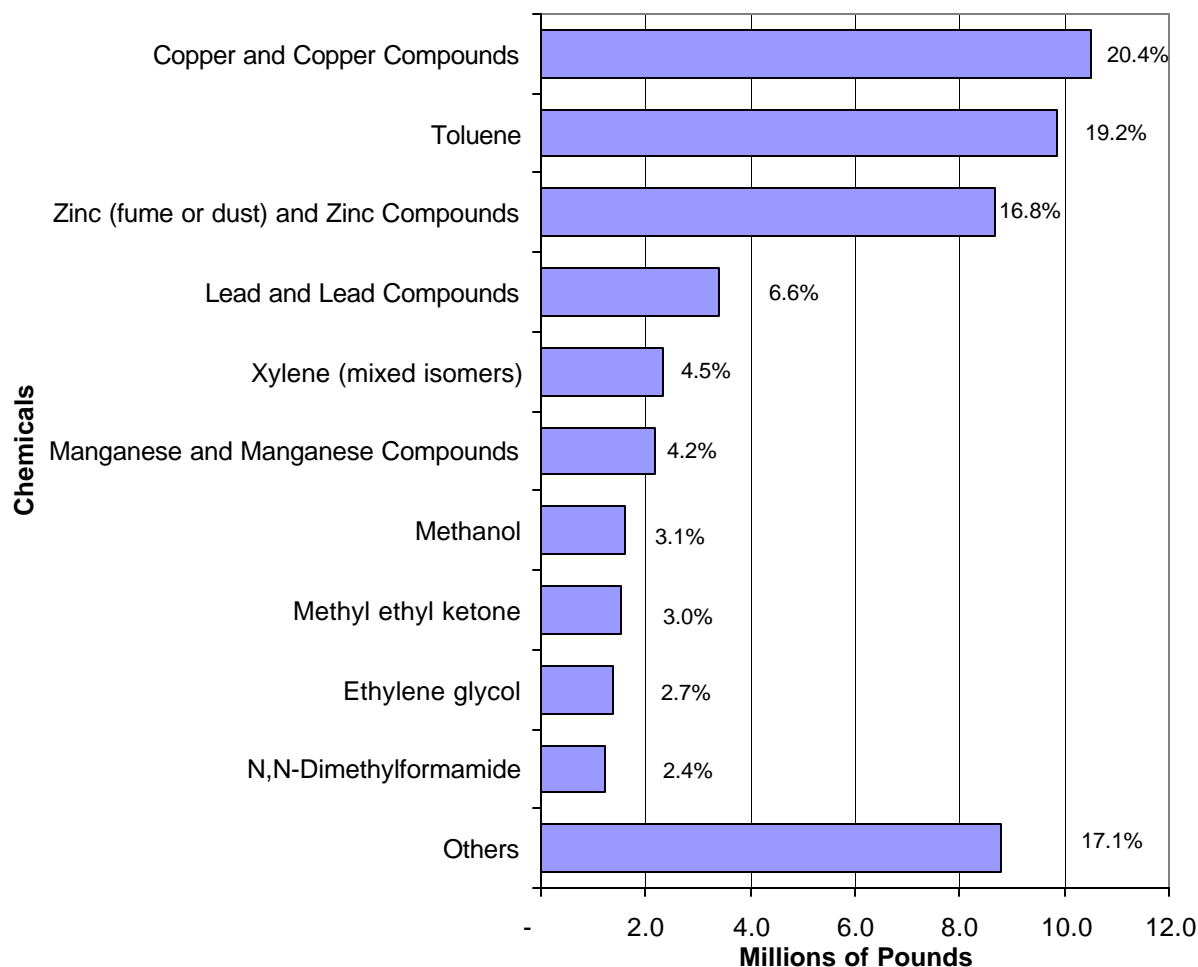


Transfers to Other Off-Site Locations

The Form R report also sets out the transfer of TRI chemicals to facilities other than POTWs. These other off-site locations include incinerators, landfills, and other treatment, energy recovery, recycling, and/or disposal facilities. Off-site transfers can be to facilities located inside or outside of the Commonwealth.

In 2002, the total amount of TRI chemicals transferred to other off-site locations was approximately 51.5 million pounds. Ten TRI chemicals represented approximately 82.9% of the total TRI chemicals transferred off-site to locations other than POTWs. The top ten TRI chemicals and chemical categories transferred off-site to locations other than POTWs in 2002 were: copper and copper compounds, toluene, zinc and zinc compounds, lead and lead compounds, xylene (mixed isomers), manganese and manganese compounds, methanol, methyl ethyl ketone, ethylene glycol, and n,n-dimethylformamide.

Figure 8. Top Ten TRI Chemicals Transferred to Off-Site Locations Other than POTWs in 2002
(from Section 6.2 of the Form R. The number next to each bar is the % of total transfers to other off-site locations)



Part Four - On-Site and Off-Site Management

Under the Pollution Prevention Act of 1990, facilities subject to EPCRA Section 313 must report their source reduction and recycling activities. Consequently, EPA added Section 8 to the Form R to track production-related activities. Section 8 contains 11 subsections and requires facilities to extract and re-aggregate data reported in Sections 5 through 7 into releases (on- and off-site releases to the environment); off-site transfers/management; and on-site management categories. Unlike Table 1, this part of Chapter One discusses all Section 8 data, so that the relative methods of toxic chemical management can be compared.

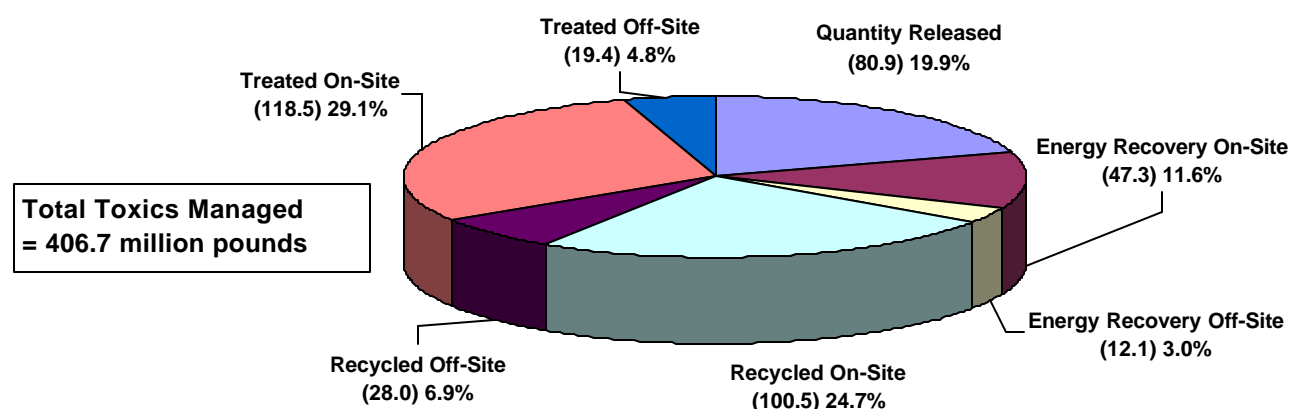
Some of the data and information reported in Sections 5, 6, and 7 are handled differently for Section 8 reporting. The differences are that the releases-to-the-environment data in Section 8 exclude catastrophic releases and one-time events not associated with the production process. Furthermore, metal and metal compounds reported as transfers for off-site management in Section 6 are aggregated with the on-site release data from Section 5 as releases to the environment. Metal and metal compounds cannot be

destroyed through treatment; hence, their final disposal is considered a release to the environment. There are other differences in how quantities are reported, so that the total toxics managed, as reported in Section 8, does not precisely match the total in Table 1. Also, Section 8 is the only part of the Form R that contains quantitative data on on-site waste management activities other than releases. While Section 7 contains qualitative information about on-site management practices, a subsection of Section 8 asks for quantitative data related to information reported in Section 7.

Consistent with the pollution prevention goal, Section 8 and its subsections also report additional information that addresses resource reduction efforts. In general, facilities utilize several options to manage TRI chemicals. Treatment of waste, both on- and off-site, involves a variety of methods, including biological treatment, neutralization, incineration, and physical separation. Another option is on- or off-site recycling. This involves the toxic chemicals in wastes being recovered or regenerated and being returned for further processing or being made available for use in commerce. Energy recovery involves the combustion of toxic chemicals in industrial furnaces or boilers that generate energy for on- or off-site use. The least preferable and last management option is disposal, which is considered a release to the environment.

As reported in Section 8 of the 2002 facility reports, more than 406 million pounds of production-related TRI chemicals were released, treated, recycled, or recovered both on- and off-site from Virginia facilities (Figure 9). Approximately 65.4% of the TRI chemicals were managed on-site and 14.7% were transferred off-site to be managed by various means. As reported in Section 8 data, 19.9% of the reported TRI chemicals were released into the environment on-site.

Figure 9. 2002 Management of TRI Chemicals (from Section 8 of Form R. The number inside the parentheses is the quantity of TRI chemicals handled by each management option in millions of pounds and the percent value is the percent of the option to the total TRI chemicals managed by all options.)



Comparison between Table 1 and Figure 9 is discouraged. Table 1 contains data extracted from Sections 5, 6, and a portion of Section 8 of the TRI reports while Figure 9 is a compilation of data reported only in Section 8. Differences in the reporting are explained above. Because of these differences, the totals for Table 1 and Figure 9 do not precisely match.

Chapter Two - 2002 TRI Data for PBT Chemicals

This chapter addresses persistent bioaccumulative toxic (PBT) chemicals. PBT chemicals are those that remain in the environment for long periods of time, are not readily destroyed, and build up or accumulate in body tissue. Because of these attributes, beginning with reporting year 2000, EPA added several PBT chemicals to the TRI reporting list, and it lowered the reporting thresholds for 18 PBT chemicals and chemical categories. Beginning with reporting year 2001, lead and lead compounds were added to the PBT list, and their thresholds lowered to 100 pounds per year. Previously, lead and lead compounds had been treated as non-PBT chemicals.

For reporting year 2002, the Department received 372 reports and revisions for PBT chemicals, out of a total of 2010 TRI reports and revisions (18.5%). Table 2 shows the reporting thresholds for the TRI PBTs. The table also shows that only seven of the 20 PBTs were reported as released, transferred, or managed by facilities in Virginia for reporting year 2002. Altogether, 207 reports and revisions for lead and lead compounds were received, with a significant portion of those resulting from the 2001 rule change. Appendix I has facility-specific information for PBT chemicals. Appendix J has general health and environmental information about the seven PBTs reported for the 2002 Virginia TRI Report.

Table 2. TRI Reporting Year 2002 Persistent Bioaccumulative Toxic (PBT) Chemicals - Reporting Thresholds and Number of Reports Received

| CAS Number | Chemical /Chemical Category Name | Reporting threshold | Reports received |
|------------|--------------------------------------|---------------------|------------------|
| 309-00-2 | Aldrin | 100 lbs. | 0 |
| 191-24-2 | Benzo(g,h,i)perylene | 10 lbs. | 35 |
| 57-74-9 | Chlordane | 10 lbs. | 0 |
| N150 | Dioxin and Dioxin-Like Compounds | 0.1 gram | 38 |
| 76-44-8 | Heptachlor | 10 lbs. | 0 |
| 118-74-1 | Hexachlorobenzene | 10 lbs. | 0 |
| 465-73-6 | Isodrin | 10 lbs. | 0 |
| 7439-92-1 | Lead | 100 lbs. | 96 |
| N420 | Lead Compounds | 100 lbs. | 111 |
| 7439-97-6 | Mercury | 10 lbs. | 12 |
| N458 | Mercury Compounds | 10 lbs. | 32 |
| 72-43-5 | Methoxychlor | 100 lbs. | 0 |
| 29082-74-4 | Octochlorostyrene | 10 lbs. | 0 |
| 40487-42-1 | Pendimethalin | 100 lbs. | 0 |
| 608-93-5 | Pentachlorobenzene | 10 lbs. | 0 |
| 1336-36-3 | Polychlorinated biphenyls (PCBs) | 10 lbs. | 0 |
| N590 | Polycyclic aromatic compounds (PACs) | 100 lbs. | 48 |
| 79-94-7 | Tetrabromobisphenol A (TBBPA) | 100 lbs. | 0 |
| 8001-35-2 | Toxaphene | 10 lbs. | 0 |
| 1582-09-8 | Trifluralin | 100 lbs. | 0 |

Table 3 provides an overview and summary of 2002 PBT data. The data is organized as in Table 1, Chapter 1. In order to avoid duplicate counting, data extracted and re-aggregated in Section 8 from Sections 5 and 6 of Form R have not been included as "On-Site Management" in Table 3.

Table 3. Summary of Data by Type of Release, Transfer, and On-Site Management for PBT Chemicals (Dioxin and dioxin-like compounds are listed separately from the "Other PBT Chemicals" column because they were reported in grams, while the other PBT chemicals were reported in pounds. A conversion to pounds is shown in parentheses.

| ON-SITE RELEASES BY MEDIA (Section 5 of Form R) | Dioxin and dioxin-like compounds* (amounts for the year) | Other PBT chemicals (amounts for the year) |
|--|--|---|
| Total Air | 265.79161 g (0.58597 lbs.) | 48,389.01 lbs. |
| Fugitive Air | 0.00988 g (0.00002 lbs.) | 6,748.03 lbs. |
| Stack Air | 265.78173 g (0.58595 lbs.) | 41,640.98 lbs. |
| Water | 2.1093 g (0.0047 lbs.) | 1,564.61 lbs. |
| Land | 1.3568 g (0.0030 lbs.) | 315,077.32 lbs. |
| Total On-Site Releases to Media | 269.25771 g (0.5936 lbs.) | 365,030.94 lbs. |
| OFF-SITE TRANSFERS BY TYPE (Section 6 of Form R) | | |
| Publicly Owned Treatment Works (POTWs) (includes metals and metal compounds) | 0 g (0 lbs.) | 1,035.67 lbs. |
| Total Other Off-Site Transfers | 9.1833 g (0.0202 lbs.) | 3,398,493.27 lbs. |
| Off-Site Transfers for Recycling | 0 g (0 lbs.) | 2,950,250.30 lbs. |
| Off-Site Transfers for Energy Recovery | 0 g (0 lbs.) | 230.59 lbs. |
| Off-Site Transfers for Other Treatment | 0 g (0 lbs.) | 13,136.70 lbs. |
| Off-Site Transfers for Disposal | 9.1833 g (0.0202 lbs.) | 434,875.68 lbs. |
| Total Off-Site Transfers | 9.1833 g (0.0202 lbs.) | 3,399,528.94 lbs. |
| ON-SITE MANAGEMENT (Section 8 of Form R) | | |
| Treated On-Site | 0 g (0.00 lbs.) | 114.8 lbs. |
| Recycled On-Site | 0 g (0 lbs.) | 22,280.84 lbs. |
| Energy Recovery On-Site | 0 g (0 lbs.) | 0 lbs. |
| Total On-Site Management | 0 g (0.00 lbs.) | 22,395.64 lbs. |
| Total PBT Chemicals Released On-site, Transferred Off-site, and Managed On-site by Reporting Facilities | 278.44101 g (0.6138 lbs.) | 3,786,955.52 lbs. |

* Facilities are allowed to report PBT chemicals up to 7 decimal places accuracy. For presentation purposes the summary amounts in this table have been rounded; however, the integrity of facility reported data has been maintained in the database. The specific data that was reported by each facility is located in Appendix I.

Comparing Table 3 (PBT information) to Table 1 (information on all TRI chemicals), the amount of reported PBTs released on-site (365,032 pounds) was 0.5% of the total TRI chemicals released on-site to the environment. The reported PBTs managed on-site (22,396 pounds) were less than one one-hundredth of one percent (0.008%) of the total TRI chemicals managed on-site. A greater percentage of PBTs were transferred off-site for treatment, recycling, energy recovery, or disposal (4.9%, or 3.4 million pounds). In reporting year 2001 (including reports and revisions), the on-site releases of PBT contributed to 0.50% of the total releases, 1.65% of on-site management, and 3.9% of off-site transfers.

Information on the amounts of each individual chemical/chemical category released on-site, transferred off-site, and managed on-site for the seven PBT chemicals reported by Virginia facilities is provided in Table 4.

Table 4. Reporting Year 2002 Amounts of TRI PBT Chemicals released on-site, transferred off-site, and managed on-site, by PBT (Dioxin and Dioxin-like compounds have been converted to pounds and included in the totals)

| Chemical Name | Released On-site (in pounds) (from Section 5) | Transferred Off-site (in pounds) (from Section 6) | Managed On-site (in pounds) (from Section 8) |
|---|--|--|---|
| Benzo(g,h,i)perylene | 19.73 | 92.08 | 3.40 |
| Dioxin and Dioxin-Like Compounds | 0.59 | 0.02 | 0.00 |
| Lead | 67,781.04 | 2,649,038.85 | 20,685.50 |
| Lead Compounds | 291,866.69 | 737,212.20 | 1,585.06 |
| Mercury | 60.01 | 67.75 | 0.00 |
| Mercury Compounds | 3,418.69 | 709.72 | 0.00 |
| Polycyclic aromatic compounds (PACs) | 1884.79 | 12,408.32 | 121.68 |
| Total for all 7 chemicals/categories | 365,031.54 | 3,399,528.94 | 22,395.64 |

Of the PBTs listed in Table 4, lead and lead compounds, polycyclic aromatic compounds (PACs), and mercury and mercury compounds contributed most to the on-site releases to the environment, off-site transfers, and on-site management of PBT chemicals. Lead and lead compounds contributed to the bulk (98.5%) of the PBT on-site releases. Referring back to Figures 5 and 8 in Chapter 1, lead and lead compounds ranked seventh in chemicals released on site to land in Virginia and fourth in chemicals transferred off-site other than to POTWs. Releases of lead and lead compounds and mercury and mercury compounds to the air (via stacks) or to the land (through fly ash disposal) can result from coal or oil combustion. PACs may form as a result of incomplete combustion of coal or oil or as a by-product of other industrial processes. PACs found in the waste stream can contain adequate BTUs for energy recovery from incinerated waste.

Previous tables and figures have shown the management and environmental releases of those PBT reported to Virginia in 2002. Table 5 data show the distribution of PBTs versus reported activities (manufacture, process, or otherwise use). These three threshold activities are defined in the Glossary of Terms (Appendix B). A facility may report more than one type of activity for a TRI chemical.

Table 5. Activities and Uses of PBT chemicals at facilities (from Section 3 of the Form R)

| Chemical Name | Activities reported | | | | | | |
|--------------------------------------|---------------------|-----------------|--------------------|---------------------------------|------------------------------------|---------------------------------|--|
| | manufacturing only | processing only | otherwise use only | both manufacturing & processing | both manufacturing & otherwise use | both processing & otherwise use | manufacturing & processing & otherwise use |
| Benzo(g,h,i)perylene | 6 | 7 | 4 | 6 | 9 | 0 | 3 |
| Dioxin and Dioxin-Like Compounds | 37 | 0 | 0 | 1 | 0 | 0 | 0 |
| Lead | 3 | 55 | 10 | 5 | 4 | 7 | 12 |
| Lead Compounds | 22 | 39 | 6 | 17 | 9 | 4 | 14 |
| Mercury | 1 | 2 | 3 | 0 | 0 | 0 | 6 |
| Mercury Compounds | 15 | 2 | 1 | 3 | 3 | 0 | 8 |
| Polycyclic aromatic compounds (PACs) | 5 | 13 | 6 | 6 | 15 | 0 | 3 |
| Total for all 7 chemicals/categories | 89 | 118 | 30 | 38 | 40 | 11 | 46 |

Table 5 shows that “processing only” was the most frequently reported activity (118) involving PBT chemicals. Processing was followed by “manufacturing only” (89), and “manufacturing, processing, and otherwise use” (46). Main industrial sectors that reported processing of lead or lead compounds were the furniture and fixture industries; stone, clay, glass, and concrete products industries; primary metal and fabricated metal products industries; electronic or electrical equipment manufacturers; petroleum bulk plant operators; and manufacturer or transportation equipment. Dioxin and dioxin-like compounds are normally a product of incomplete combustion of waste stream containing chlorinated products. Lead or lead compounds can be co-manufactured under chemical manufacturing processes or as a by-product of fuel (coal or fuel oil) combustion. Industries such as primary metal; stone, clay, and glass products; transportation equipment manufacturers; electric power generation facilities; solvent recovery facilities; and paper and allied products industries were key reporters of lead compounds and mercury compounds in all three (manufacturing, processing, and otherwise used) activities.

CHAPTER THREE - INDUSTRIAL SECTORS, FACILITIES, AND JURISDICTIONS

In this chapter, the 2002 Virginia TRI Report presents information on industrial sectors, as identified by the primary standard industrial classification code (Part One), facilities (Part Two), and facility locations (Part Three). The Virginia Code requires the Virginia TRI Report to address these considerations. The chapter identifies the top ten Virginia industrial sectors, facilities, and facility locations (jurisdictions) based on the reported on-site releases and the total on-site management of TRI chemicals.

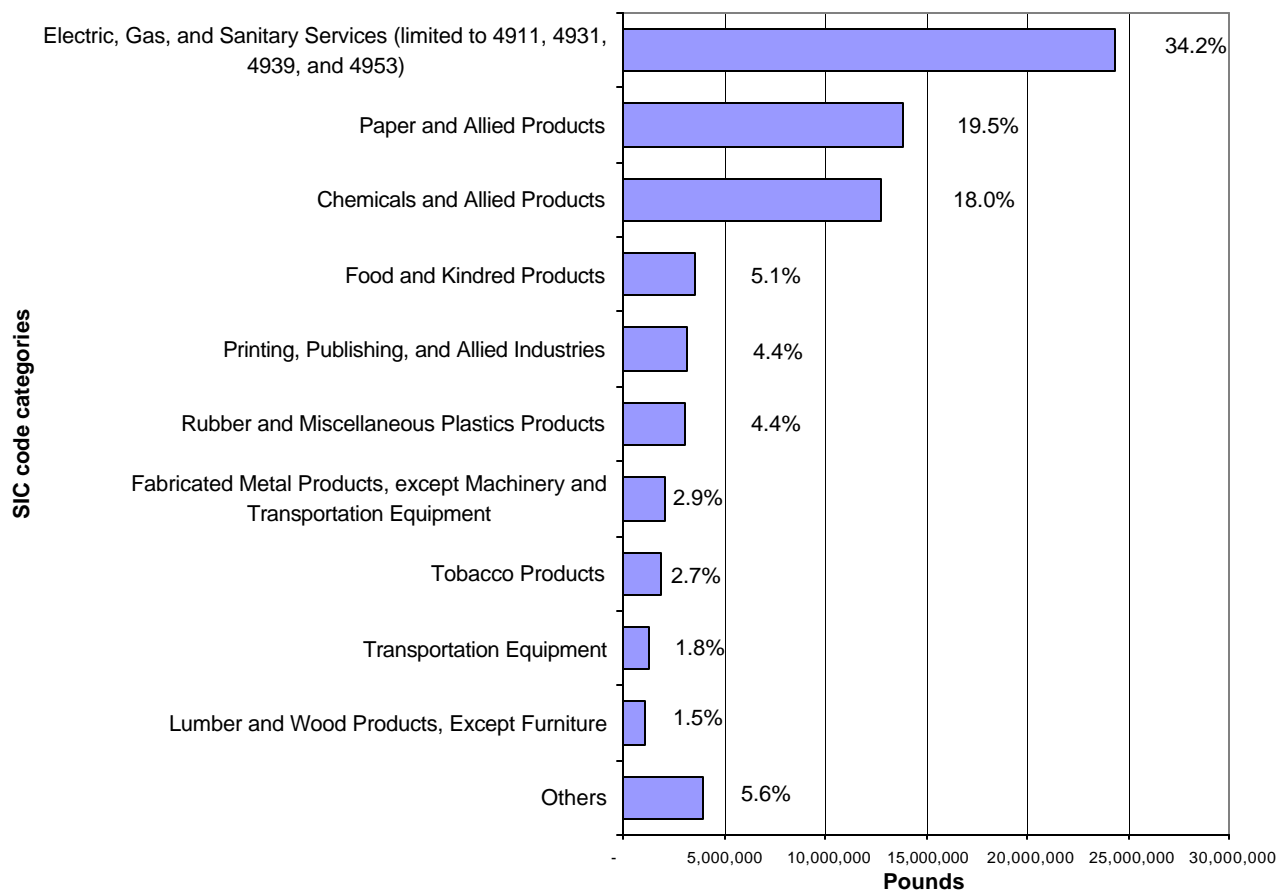
As with Table 1 (Chapter 1) and Table 3 (Chapter 2), in order to avoid double counting, the data in this chapter for on-site management do not include the data extracted and re-aggregated from Sections 5 and 6 of Form R. Complete rankings of industrial sectors, facilities, and jurisdictions are included in Appendices K, L, and M.

Part One - Industrial Sectors

Industrial Sectors Reporting On-Site Releases of TRI Chemicals

Twenty-nine (29) industrial sectors, as well as federal facilities, are subject to TRI reporting requirements (see Appendix E). The three industrial sectors reporting the most on-site releases of TRI chemicals for 2002, based on the primary Standard Industrial Classification (SIC) code, were: electric, gas, and sanitary services; paper and allied products; and chemicals and allied products. These three sectors contributed to 71.7% of the total on-site releases to the environment. The remaining top ten reporting industrial sectors for 2002 were: food and kindred products; printing, publishing, and allied industries; rubber and miscellaneous plastics products; fabricated metal products; tobacco products; transportation equipment; and lumber and wood products (except furniture). A complete ranking of industrial sectors reporting on-site TRI releases is in Appendix K-1.

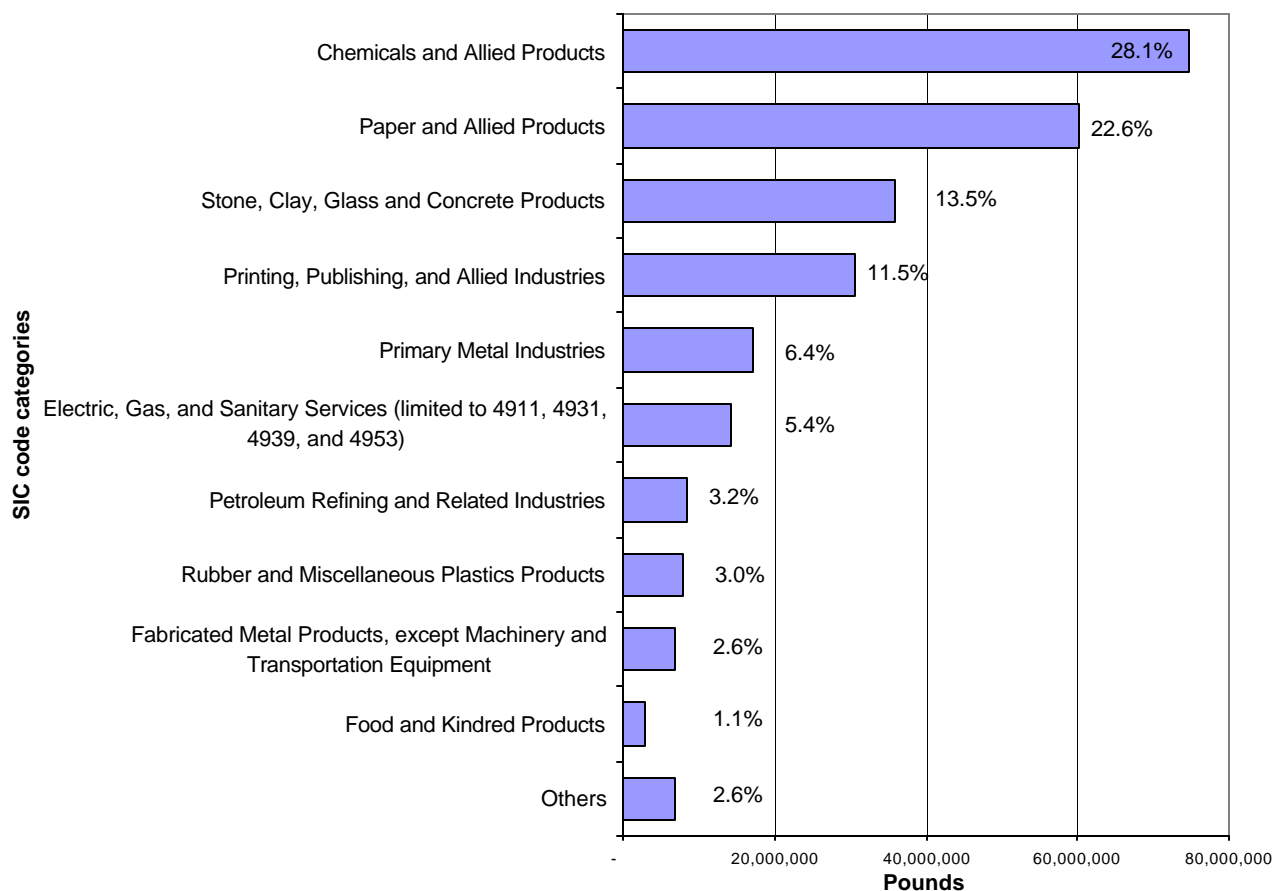
Figure 10. Top 10 Reporting Industrial Sectors (based on SIC codes) Releasing TRI Chemicals On-Site in Virginia for 2002 (from Section 5 of the Form R. The number next to each bar is the % of total on-site releases for all 2002 chemicals reported.)



Industrial Sectors Reporting On-Site Management of TRI Chemicals

The four industrial sectors reporting the most on-site management of TRI chemicals for 2002, based on the primary Standard Industrial Classification (SIC) code, were: chemicals and allied products; paper and allied products; stone, clay, glass, and concrete products; and printing, publishing, and allied industries. These four sectors contributed to 75.7% of the total of on-site management of TRI chemicals. The remaining top ten reporting industrial sectors for 2002 were: primary metal industries; electric, gas, and sanitary services; petroleum refining and related industries; rubber and miscellaneous plastics products; fabricated metal products; and food and kindred products. A complete ranking of industrial sectors reporting on-site TRI management is in Appendix K-2.

Figure 11. Top 10 Reporting Industrial Sectors (based on SIC codes) Managing TRI Chemicals On-Site in Virginia for 2002 (from Section 8 of the Form R. The number next to each bar is the % of total of on-site management for all 2002 chemicals reported. This figure does not include the data extracted and re-aggregated from Sections 5 and 6 of Form R.)



Part Two - Facilities

Facilities Reporting On-Site Releases of TRI Chemicals

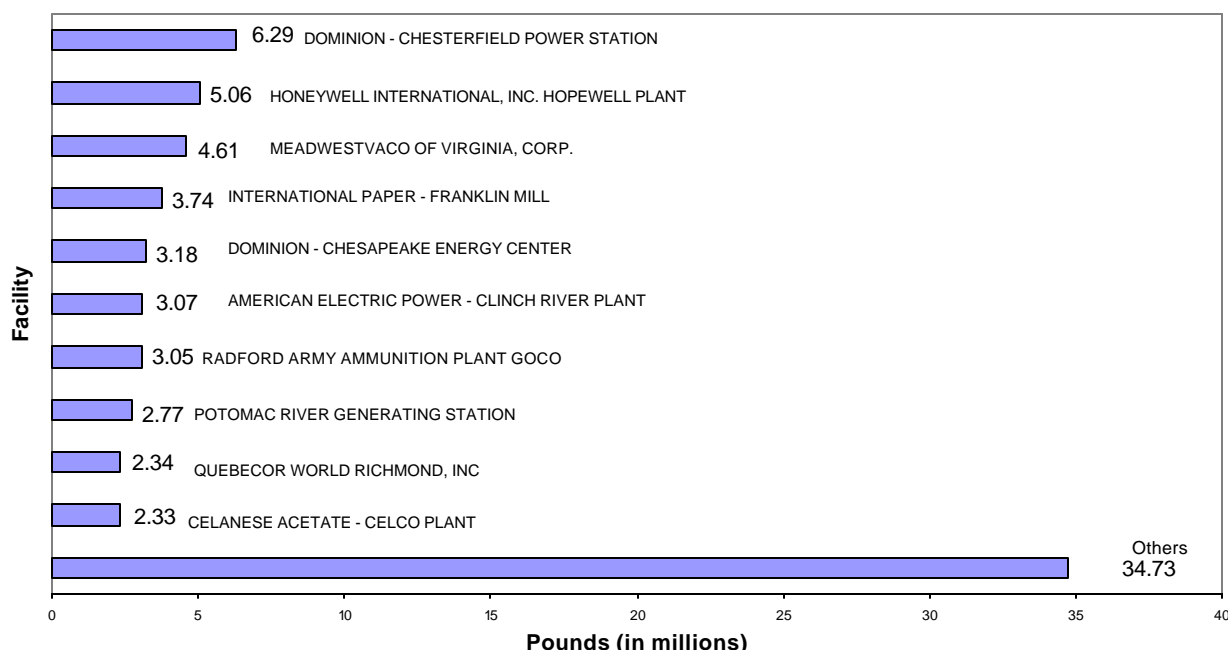
Virginia facilities that reported the highest contributions to the on-site release of TRI chemicals to the air (fugitive and stack), water, and land in 2002 were:

- Dominion - Chesterfield Power Station - 500 Coxendale Road, Chester, Chesterfield County
- Honeywell International, Inc. Hopewell plant - Route 10 & Industrial Street, Hopewell City
- MeadWestvaco of Virginia, Inc. - 104 E. Riverside St, Covington, Alleghany County
- International Paper - Franklin Mill - 34040 Union Camp Drive, Franklin, Isle of Wight County
- Dominion - Chesapeake Energy Center - 2701 Vepco Street, Chesapeake City
- American Electric Power - Clinch River Plant - Junction of State Rte 664 & 665, Cleveland, Russell County
- Radford Army Ammunition Plant - government owned, contractor operated (GOCO) - Route 114, Radford, Montgomery County
- Potomac River Generating Station - 1400 North Royal Street, Alexandria City
- Quebecor World Richmond, Inc. - 7400 Impala Dr., Henrico County

- Celanese Acetate - Celco Plant - 3520 Virginia Avenue, Narrows, Giles County

These facilities accounted for 51.2% (36.4 million pounds) of all reported TRI releases to these media for 2002. Of the ten facilities, four are power generation facilities, two are paper and allied products facilities, two are chemical and allied products facilities, one is a commercial printing (gravure) facility, and one is a federal facility. Figure 12 shows the quantity of TRI chemicals each of these facilities released in Virginia in 2002. See Appendix L-1 for a complete ranking of on-site releases by facility.

Figure 12. 2002 Top Ten Virginia Facilities Reporting Releases of TRI Chemicals On-Site (from Section 5 of the Form R. The number next to each bar is the total on-site releases (in millions of pounds) for each facility.)



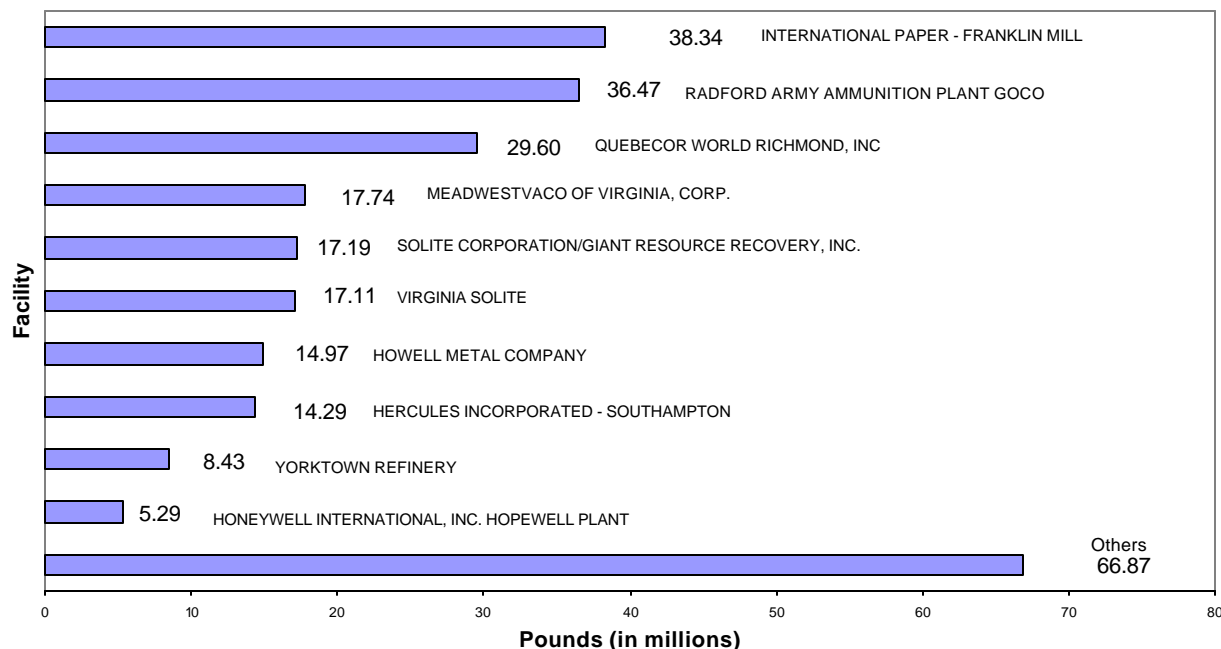
Facilities Reporting On-Site Management of TRI Chemicals

Figure 13 shows the ten Virginia facilities reporting management of the greatest quantity of TRI chemicals on-site in 2002, other than releases. These facilities were:

- International Paper - Franklin Mill - 34040 Union Camp Drive, Franklin, Isle of Wight County
- Radford Army Ammunition Plant - government owned, contractor operated (GOCO) - Route 114, Radford, Montgomery County
- Quebecor World Richmond, Inc. - 7400 Impala Dr., Henrico County
- MeadWestvaco of Virginia, Inc. - 104 E. Riverside St, Covington, Alleghany County
- Solite Corporation/Giant Resource Recovery, Inc. - State Route 652, Arvon, Buckingham County
- Virginia Solite - 101 Solite Rd., Cascade, Pittsylvania County
- Howell Metal Company - 574 Depot Rd., New Market, Shenandoah County
- Hercules Incorporated - 27123 Shady Brook Trail, Courtland, Southampton County
- Yorktown Refinery - 2201 Goodwin Neck Rd., Grafton, York County
- Honeywell International, Inc. Hopewell plant - Route 10 & Industrial Street, Hopewell City

These facilities accounted for 74.9% (199.4 million pounds) of all reported on-site management (other than releases) in 2002. Figure 13 shows the quantity of TRI chemicals each of these facilities managed on-site in Virginia in 2002. Of the ten facilities, two are paper and allied products facilities; two are chemical and allied products facilities; one is commercial printing (gravure) facility; one is a federal facility; two are stone, clay, glass, concrete facilities; one is a primary metal industry; and one is a petroleum refinery. See Appendix L-2 for a ranking of on-site management by facility.

Figure 13: 2002 Top Ten Virginia Facilities Managing TRI Chemicals On-Site, Other than Releases (from Section 8 of the Form R. The number next to each bar is the total on-site management (in millions of pounds) for each facility. This figure does not include the data extracted and re-aggregated from Sections 5 and 6 of Form R.)



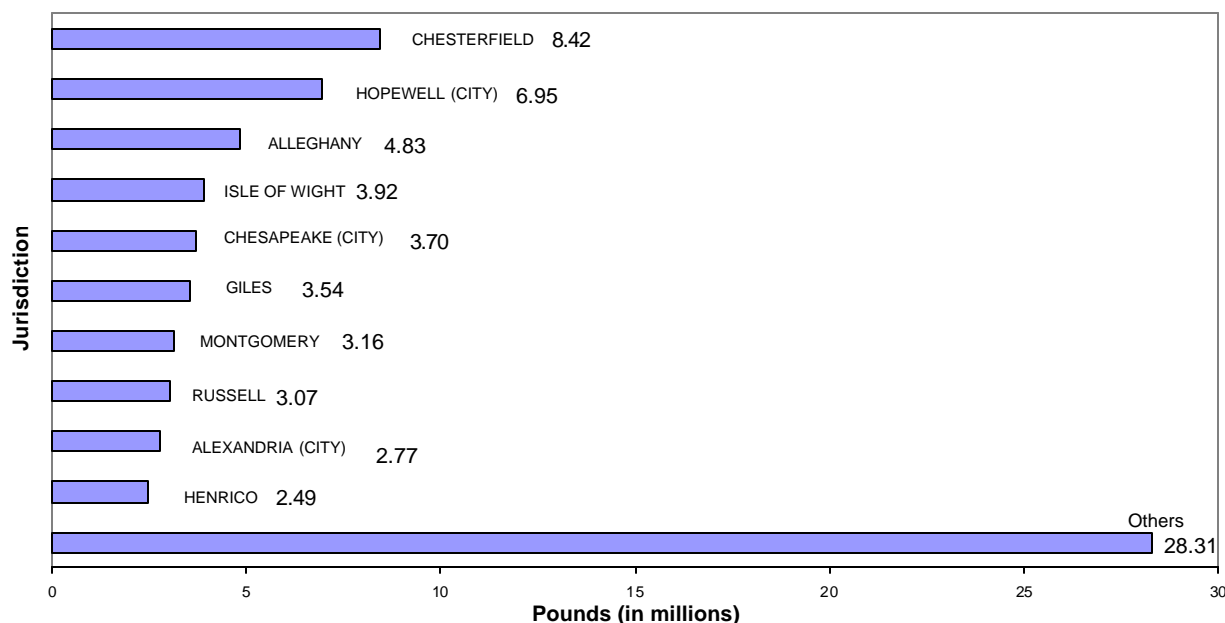
Part Three - Jurisdictions

Jurisdictions with Facilities Reporting On-Site Releases of TRI Chemicals

The Virginia jurisdictions (counties and independent cities) with facilities having the largest reported amount of total TRI chemicals released on-site to the environment (air, water, and land) in 2002 were as follows: Chesterfield County; Hopewell City; Alleghany County; Isle of Wight County; Chesapeake City; Giles County; Montgomery County; Russell County; Alexandria City; and Henrico County. The reported on-site releases occurring within these jurisdictions comprised 60.2 % (42.8 million pounds) of the total TRI chemicals released on-site into the Virginia environment by Virginia facilities.

Appendix M-1 of this document contains a ranking of jurisdictions by the on-site releases of facilities located there. Furthermore, Appendices H and I contain detailed information about facilities located in these jurisdictions.

Figure 14. 2002 Top Ten Virginia Jurisdictions with the Largest Amount of On-Site TRI Releases Reported by Facilities: from Section 5 of the Form R. The number next to each bar is the total on-site releases (in millions of pounds) for each jurisdiction.

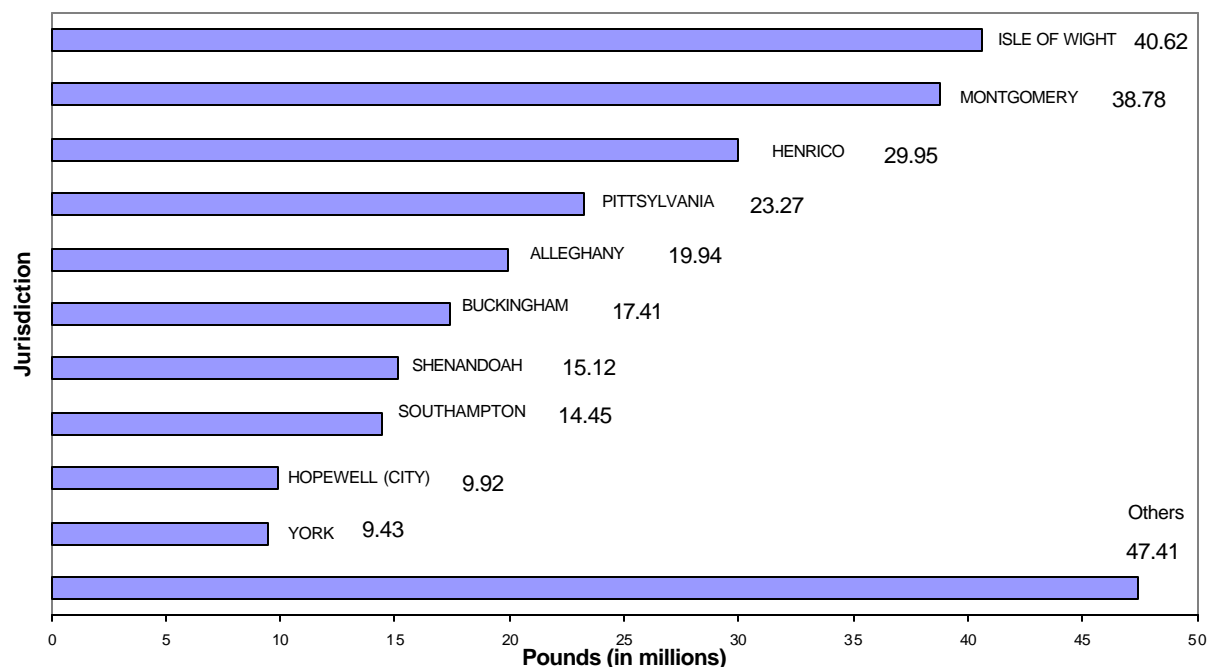


Jurisdictions with Facilities Reporting Other On-site Management of TRI Chemicals

The Virginia jurisdictions with facilities having the largest amount of total reportable TRI chemicals managed on-site (other than releases) were: Isle of Wight County; Montgomery County; Henrico County; Pittsylvania County; Alleghany County; Buckingham County; Shenandoah County; Southampton County; Hopewell City; and York County. The on-site management of these chemicals in these jurisdictions comprised 82.2% (218.9 million pounds) of total TRI chemicals managed on-site (other than releases) by reporting facilities in Virginia.

Appendix M-2 of this document contains a ranking of jurisdictions by the on-site management of facilities located there. Furthermore, Appendices H and I contain detailed information about facilities located in these jurisdictions.

Figure 15. 2002 Top Ten Virginia Jurisdictions with the Largest Amount of TRI Chemicals Managed On-Site as Reported by Facilities: (from Section 8 of the Form R. The number next to each bar is the total on-site management (in millions of pounds) for each jurisdiction. This figure does not include the data extracted and re-aggregated from Sections 5 and 6 of Form R.)



CHAPTER FOUR - VIRGINIA TRI HISTORICAL COMPARISON

Direct comparisons between the 2002 Virginia TRI Report and past published Virginia TRI reports is discouraged, because of changes in reporting requirements and because of the authorized incorporation of revisions from previous years. Nevertheless, Chapter Four presents some historical comparisons using data that have been normalized to make the years comparable, and includes new reports and revisions received on or before January 14, 2004.

Since its inception, the TRI program has been expanding and evolving, providing more information to the public about the presence and release of toxic and hazardous chemicals in communities. In fact, over the past 14 years, four major regulatory changes have occurred that made the direct historical comparison of releases from 1988 to 2002 difficult and potentially misleading. During the early years of the program there were no major reporting changes. From 1988 until 1994 the consistency between reporting sectors and chemicals made comparison straightforward.

The first major change in reporting requirements was the addition of 286 chemicals and chemical categories to the TRI list beginning with reporting year 1995. The addition of chemicals in reporting year 1995 created a new baseline for TRI comparisons.

The second major change was the inclusion of seven, new non-manufacturing sectors (sectors that had not previously reported) to the TRI facility coverage beginning in the 1998 reporting year. With this change, 1998 became the new baseline for historical comparison. Thus, Chapter Four covers the period 1998 to 2002, because those years cover the same reporting sectors. Historical evaluations of on-site releases from 1988 to 1994 and from 1995 to 1997 can be found in the Appendix G.

A third adjustment to the period from 2000 to 2002 had to be made. Beginning with reporting year 2000, seven chemicals and two chemical categories (PBTs and vanadium and vanadium compounds) were added to the TRI chemical list. These newly added chemicals and chemical categories must be subtracted from reporting year 2000, 2001, and 2002 data to make comparisons to 1998 and 1999 more accurate.

Finally, beginning in reporting year 2001, the lead and lead compounds were designated as PBT chemicals and the threshold for reporting was reduced to 100 pounds. This caused facilities to submit significantly more reports for lead and lead compounds.

Facilities are authorized to revise reports from previous years. For example, since last year's report, there were 28 report revisions and another 28 new reports affecting calendar year 2001 data. Thus, the 2002 Virginia TRI Report shows numbers and percentages for 1998 through 2001 that are different from those in previous reports. All revisions received on or before January 14, 2004 have been incorporated into this report.

Table 6 shows the amounts of releases to each media for the reporting years 1998 through 2002. Figure 16 shows the historical on-site releases from 1998 to 2002 using stacked bars to show the differences in media.

Table 6. On-Site Releases Comparison from 1998 to 2002 (from Section 5 of Form R)

* Newly added chemicals in 2000 that were not reported previously were not counted for this data comparison.

| Media | 1998 (pounds) | 1999 (pounds) | 2000 (pounds) | 2001 (pounds) | 2002 (pounds) | Percent change 1998-2002 | Percent change 2001-2002 |
|-------|---------------|---------------|---------------|---------------|---------------|--------------------------|--------------------------|
| Air | 63,917,097 | 61,406,080 | 58,848,923 | 57,127,421 | 56,923,331 | -10.94 | -0.36 |
| Water | 6,301,409 | 6,157,115 | 8,190,510 | 7,000,339 | 8,262,375 | 31.12 | 18.03 |
| Land | 4,392,513 | 5,344,373 | 5,955,480 | 6,442,197 | 5,973,503 | 35.99 | -7.28 |
| Total | 74,611,019 | 72,907,568 | 72,994,913 | 70,569,957 | 71,159,209 | -4.63 | 0.83 |

The historical comparison suggests that the amount of TRI chemicals (excluding seven PBTs and vanadium and vanadium compounds) released to the environment from Virginia facilities has decreased by approximately 4.63% since 1998, but increased by 0.83% between 2001 and 2002. The on-site air releases continued to decrease, although at a very small percentage (-0.36%) compared to last year's reduction. The 2002 data shows an 18.03% increase in on-site releases to water over 2001 data, following a proportional decrease from 2000 to 2001. The reported discharges to land during 2002 decreased for the first time since 1998, by 7.28 %.

Figure 16. Comparison of Total On-Site Releases to Media (Air, Land, and Water) 1998-2002 (from Section 5 of the Form R)

*Newly added chemicals in 2000 that were not reported previously are not reflected in this data comparison. The percent values on each bar represent the proportion of that year's total on-site releases. For example, total on-site air releases in 1998 were 85.7% of the total releases. Vanadium and vanadium compounds were required to be reported beginning in reporting year 2000; hence they are not reflected in Figure 16. PBT chemicals that were not reported in previous years are similarly not reflected.

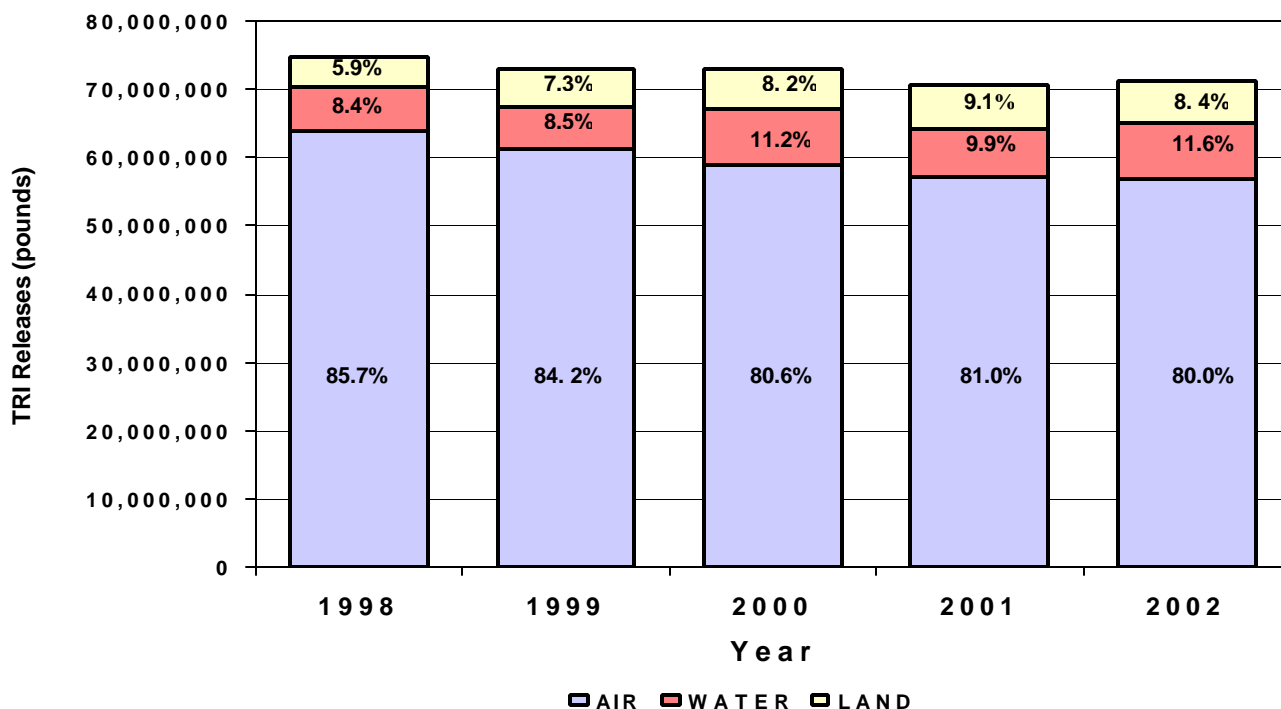


Table 7 compares, in detail, the TRI data by type of release, transfer, and on-site management for reporting years 2000 to 2002. Because of the similarity of 2000, 2001, and 2002 data, all TRI chemicals are included in this table. This includes lead and lead compounds, for which the reporting threshold changed beginning in reporting year 2001. For reporting year 2002, each of the three subtotal amounts (on-site release, off-site transfer, other on-site management) show a small (<1%) increase over the amounts for calendar year 2001 (including reports and revisions). Because facilities are authorized to revise reports from previous years, the 2002 Virginia TRI Report shows numbers for 1998 to 2001 that are different from those in previous reports. For example, without the authorized revisions to the 2001 data, both off-site transfers and on-site management would have shown small (<1%) decreases for 2002, rather than small increases. All revisions received on or before January 14, 2004 have been incorporated into this report.

Table 7. Comparison Summary Data by Type of Release, Transfer, and On-site Management for TRI chemicals for 2000 and 2001 (from Table 1)

*Newly added chemicals in 2000 are counted for this data comparison.

| MANAGEMENT ACTIVITIES | YR 2000 (POUNDS) | YR 2001 (POUNDS) | YR 2002 (POUNDS) | CHANGES 2001 - 2002 | % CHANGE 2001 - 2002 | % CHANGE 2000 - 2002 |
|-------------------------------------|---------------------|---------------------|---------------------|------------------------|-------------------------|-------------------------|
| ON-SITE RELEASES | | | | | | |
| AIR (TOTAL) | 58,848,843 | 57,127,320 | 56,923,346 | (203,974) | -0.36% | -3.27% |
| FUGITIVE AIR | 6,738,284 | 7,615,280 | 6,392,054 | (1,223,226) | -16.06% | -5.14% |
| STACK AIR | 52,110,559 | 49,512,040 | 50,531,292 | 1,019,252 | 2.06% | -3.03% |
| WATER | 8,190,508 | 7,000,343 | 8,262,380 | 1,262,037 | 18.03% | 0.88% |
| LAND | 5,955,478 | 6,442,196 | 5,973,504 | (468,692) | -7.28% | 0.30% |
| UNDERGROUND INJECTION WELLS | 0 | 5 | 0 | (5) | | |
| TOTAL | 72,994,828 | 70,569,865 | 71,159,230 | 589,365 | 0.84% | -2.51% |
| OFF-SITE TRANSFERS | | | | | | |
| POTW | 16,813,569 | 17,805,373 | 17,327,432 | (477,941) | -2.68% | 3.06% |
| OTHER OFF-SITE TRANSFERS (TOTAL) | 47,354,540 | 50,621,166 | 51,533,591 | 912,425 | 1.80% | 8.83% |
| RECYCLING | 27,560,248 | 28,253,654 | 29,444,577 | 1,190,923 | 4.22% | 6.84% |
| ENERGY RECOVERY | 9,352,550 | 8,680,816 | 11,597,088 | 2,916,272 | 33.59% | 24.00% |
| OTHER TREATMENT | 1,509,576 | 2,850,674 | 2,030,466 | (820,208) | -28.77% | 34.51% |
| DISPOSAL | 8,932,167 | 10,836,021 | 8,461,460 | (2,374,561) | -21.91% | -5.27% |
| TOTAL | 64,168,109 | 68,426,539 | 68,861,023 | 434,484 | 0.63% | 7.31% |
| ON-SITE MANAGEMENT | | | | | | |
| TREATED ON-SITE | 94,003,121 | 141,220,973 | 118,522,101 | (22,698,872) | -16.07% | 26.08% |
| RECYCLED ON-SITE | 122,010,789 | 94,875,493 | 100,513,775 | 5,638,282 | 5.94% | -17.62% |
| ENERGY RECOVERY ON- SITE | 43,585,093 | 27,825,485 | 47,264,002 | 19,438,517 | 69.86% | 8.44% |
| TOTAL | 259,599,002 | 263,921,951 | 266,299,878 | 2,377,927 | 0.90% | 2.58% |
| GRAND TOTAL | 396,761,939 | 402,918,355 | 406,320,131 | 3,401,776 | 0.84% | 2.41% |

The most noticeable changes seen for the on-site releases in this table are the 18% increase in on-site water discharge from 2001 to 2002; a decrease in land disposal (7.28%); and a small climb in the overall on-site releases to the environment (at 0.84%).

Table 7 shows that the transfers of TRI chemicals to off-site facilities for further management or disposal continues to increase at a steady pace. However, the chemical management options within the off-site transfers show much more of a cyclic pattern. More noticeably for the 2002 reporting were the increases in the usage of off-site facilities for recycling and energy recovery, in lieu of disposal options, as compared to 2001 data. In the on-site management portion of the data comparison, again, within the on-site management options, the data shows more of cyclic pattern from one year to another. However, the overall quantities of TRI chemicals managed on-site continues to increase.

A list of supplementary resources about the Toxics Release Inventory is found in Appendix N.

CHAPTER 5 - CONCLUSION

The 2002 Virginia TRI Report is issued under mandate of state law. The report has information on chemicals and chemical categories, activities involving their use, industrial sectors, facilities, and facility locations (jurisdictions). It provides historical perspective on TRI chemicals in the Commonwealth.

The report provides the public with information concerning listed toxic chemicals and chemical categories that are manufactured, processed, or otherwise used at Virginia facilities, including amounts released to the environment, transferred off-site, and managed on-site. Industry can use the data in a variety of ways, including a measurement of its progress toward reduction targets.

There are limitations on the use of TRI data, especially with regard to assessment of risk and the comparison of data for various years.

Since 1988, the amount of TRI chemicals released or otherwise managed has historically decreased. The data for reporting year 2002, however, show a small (<1%) increase the amount of TRI chemicals released on-site, transferred off-site, and managed on-site, based on the latest reports and revisions. At this time, it is not possible to predict with confidence whether these trends will continue.

All parts of the agency and other sectors of government, all Virginia businesses and industry, and all Virginia's citizens have a role in managing and controlling the release of toxic chemicals in the Commonwealth. This report assists these entities with monitoring toxic chemicals that are manufactured, processed, and used at Virginia facilities.

APPENDIX A

Va. Code § 10.1 - 1186.1

APPENDIX B

Glossary of Terms

APPENDIX C

VA TRI Stakeholder Meeting Minutes

APPENDIX D

TRI Reporting Changes

APPENDIX E

TRI-Covered Industry Groups by Standard Industrial Classification Code

APPENDIX F - 1

**2002 TRI Reporting
Form R**

APPENDIX F - 2

**2002 TRI Reporting
Form A**

APPENDIX G

VA TRI Historical Trend 1988-1997

APPENDIX H

2002 Summary of Facilities, Chemical Releases, Transfers, and Management (Non - PBT Chemicals)

Note: To find total quantities for an individual facility or jurisdiction,
the amounts in Appendix H and Appendix I must be combined.

APPENDIX I

2002 Summary of Facilities, PBT Chemical Releases, Transfers, and Management

Note: To find total quantities for an individual facility or jurisdiction,
the amounts in Appendix H and Appendix I must be combined.

APPENDIX J

General Health Effects of PBT Chemicals In Virginia Reports

APPENDIX K - 1

2002 VA TRI SIC Code Ranking by On-Site Releases

APPENDIX K - 2

**2002 VA TRI
SIC Code Ranking By On-Site Management**

APPENDIX L - 1

**2002 VA TRI
Facility Ranking By On-Site Releases**

APPENDIX L - 2

2002 VA TRI Facility Ranking by On-Site Management

APPENDIX M - 1

**2002 VA TRI
Jurisdiction Ranking By On-Site Releases**

APPENDIX M - 2

**2002 VA TRI
Jurisdiction Ranking by On-Site Management**

APPENDIX N

Supplementary Resources